Grand Forks Water Treatment Plant
412 S. 3rd St, 502 S. 3rd St, and 503 S. 4th St,
Grand Forks, ND 58201
Grand Forks
Grand Forks County
North Dakota

HAER No. ND-18

September 2022

Prepared By:
Urbana Preservation & Planning, LLC
7705 El Cajon Blvd, Unit 1
La Mesa, CA 91942
www.urbanapreservation.com

Property Owner and Project Sponsor:
City of Grand Forks
225 N 4th Street
Grand Forks, ND 58203

Submitted To:
HISTORIC AMERICAN ENGINEERING RECORD
NATIONAL PARK SERVICE
U.S. Department of the Interior
1849 C Street NW, Mail Stop 7408
Washington, DC 20240

HISTORIC AMERICAN ENGINEERING RECORD

GRAND FORKS WATER TREATMENT PLANT

HAER No. ND-18

Location: **412 S. 3rd St, 502 S. 3rd St, and 503 S. 4th St, City of Grand Forks, Grand Forks County, North Dakota**

UTM Location/References:
Plant Complex: Zone 14T 647634.97 mE / 5309404.30 mN
Pretreatment Facility: Zone 14T 647547.01 mE / 5309426.33 mN
Residual Pump Station: Zone 14T 647582.45 mE / 5309460.76 mN

Present Owner: City of Grand Forks
255 N. 4th Street, Grand Forks, ND 58203

Present Use: Not in use; scheduled for demolition.

Significance: The Grand Forks Water Treatment Plant (GFWTP) is significant for its role in the development of municipal city infrastructure during the twentieth century in Grand Forks. As part of cultural resources studies of the property, the GFWTP was found to have a low degree of historic integrity, but a strong association to the development of Grand Forks over time. Therefore, the property is considered potentially eligible for inclusion on the National Register of Historic Places under Criterion A.

Historians: Wendy L. Tinsley Becker, AICP, RPH; John Hyche, MA;
Urbana Preservation & Planning, LLC / 7705 El Cajon Blvd Unit 1, La Mesa, CA 91942, 619.543.0693 / www.urbanapreservation.com | September 2022

Project Information: The GFWTP is a Late Modern style complex that dates to 1956, when Burns & McDonnell Engineering Company were contracted by the City of Grand Forks to make waterworks improvements to an existing facility built in 1939 within Viet's Addition subdivision located southeast from downtown Grand Forks. Allan H. Wymore worked as the lead engineer on the project. A water treatment plant was originally built on the property at 502 S. 3rd St in 1939. In 1956, the building was expanded to encompass the 503 S. 4th St lot and in 1968 the 1939 facility was demolished and replaced. In 1984, the 1956 building received an addition and the plant was expanded to encompass half of Block 5 at 412 S. 3rd St. The plant ceased operation in 2020 after a new plant was constructed on the western outskirts of Grand Forks. This HAER documentation project was requested and funded by the City of Grand Forks part of a development project that will result in the demolition of the buildings at the site. Wendy L. Tinsley Becker, AICP, RPH; and John Hyche, MA, Associate Historian and Preservation Planner; of Urbana Preservation & Planning, LLC., prepared this report. Existing conditions photographs by Rob Park, of Robert C. Park Photographer, 115 S. Main Street, Livingston, Montana.

For the large-format photographs of the Grand Forks Water Treatment Plant, see:

HAER No. ND-18	Grand Forks Water Treatment Plant
HAER No. ND-18-A	Plant Complex
HAER No. ND-18-B	Pretreatment Facility
HAER No. ND-18-C	Residual Pump Station

PART I. HISTORICAL INFORMATION

A. PHYSICAL HISTORY

Dates of Construction: The earliest extant portion of the GFWTP was built in 1956 by the Burns & McDonnell Engineering Company and Eickhof Construction Company. Allan H. Wymore worked as the lead engineer on the project.

Architect: Burns & McDonnell Engineering Company (1956); Unknown (1968); KBM, Inc. (1984); Wells Denbrook Adams Inc.(1984); Unknown (2003)

Builder: Eickhof Construction Company (1956); Unknown (1968); Unknown (1984); Unknown (2003)

Original Plans and Construction: The oldest extant portion of the GFWTP from 1956 included an older part of the building from 1939 that has since been replaced and is no longer extant. However, the physical description of the 1939 and 1956 parts of the GFWTP cannot be separated, as they were combined to form a single building occupying the block. The GFWTP in 1956 featured a three-story brick mass at the corner of S. 4th St and a two-story brick massing at the corner of Franklin Avenue and S. 3rd St. The rear of the building to the east and south featured a one-story extension clad in brick, apart from one wall facing S. 4th St. All rooflines were flat covered in tar and gravel. The front entrance along S. 4th St had a glass door entryway with a stripe of marble rising to the roofline in the center of the mass. Extending southeast out from the three-story mass at the entrance, a single-story concrete block wall extended across the remainder of the S. 4th St elevation. Another stripe of marble and cut stone was present on the Minnesota Avenue elevation, along with four square hopper windows along the single-story part of the building. The S. 3rd St elevation featured two doorways with short stairways up to the entrances with no windows. The Franklin Avenue elevation was asymmetrical and featured rows of three square hopper windows on each floor of the three-story mass in the east corner of the building. Five additional hopper windows were present along the length of the elevation with a loading bay lined with cut-stone trim in the center.

Alterations and Additions: The original 1885 City Water Works Pump House at 501 S. 3rd St was expanded in 1939 across S. 3rd St to the southeast corner of S. 3rd St. In 1956, the 1885 pump house was decommissioned and the 1939 parts at the plant were expanded to occupy the entirety of Block 8 within Viet's Addition. In 1968, the 1939 portions of the plant were removed and replaced with a concrete, steel, and cinderblock building to match the 1956 plant. In 1974, the city commissioned a lime sludge dewatering plant (also called the Water Reclamation Facility) was built on the lot formerly occupied by the 1885 City Water Works Pump House. Ten years later, in 1984, portions of the 1956 building were further modified, and the water treatment plant grew onto Block 5 where a Pretreatment Facility was built. The new building connected to the original plant by a raised and covered walkway. In 2003, the Water Reclamation Facility was removed for a floodwall, a small

Residual Pump Station replaced that building, and a new Raw Water Intake Facility (out of scope) was constructed southeast of the GFWTP. In 2020, a new water treatment plant was completed, and the current property was decommissioned. Since 1984, the exterior of the GFWTP has remained largely unaltered in its original location. Elements of the 1956 and 1968 additions remain intact, though the property, as a whole, has been heavily modified and modernized over time.

B. HISTORICAL CONTEXT

Early Settlement in Grand Forks

Before European settlement in the area, the Red River Valley was a fertile flatland that suited tribes of Native Americans well when traversing the plains seasonally in their search for food and resources. Rich soil and abundant wildlife made the region a prime location for fur trading posts when the first European colonizers arrived at the turn of the nineteenth century.[1]

Alexander Henry of the North West Company established the first fur trading post at the confluence of the Red River and the Red Lake River, in the area that would later become Grand Forks. The Hudson's Bay Company soon followed suit and established their own fur trading outpost in the same location. As the fur trade expanded over the following decades, this location served as an important way station for traders, settlers, and military outfits traversing the area by land or river using boats, and later steamboats in the second half of the nineteenth century.[2]

While the fur trading settlements grew, the first formal settlement of land in Grand Forks did not occur until 1870-71, when Alexander Griggs, filed the first homestead claim on the west side of the river fork, in what is today downtown Grand Forks. Griggs, a steamboat captain who used flatboats to carry cargo down the Red River of the North, established a sawmill and other businesses soon populated the surrounding area. As a result, Griggs is now known as the founder of Grand Forks. New residents of the settlement quickly established a boarding house, hotel, stage station, and saloon. In 1872, the Northern Pacific railroad established a stop in Moorhead Minnesota across from Fargo to the south and Grand Forks became a stop on the stage route from Moorhead to Winnipeg.[3] The following year, in 1873, the Dakota territorial legislature established Grand Forks County and named Grand Forks as the county seat. Following this designation, Griggs registered a plat for the Village of Grand Forks on 90 acres of his homestead claim. Viet's Addition, along with the Hubert and Traill Additions were soon filed in 1878 and 1879, south of downtown. The

[1] Ann Emmons, Connie Walker-Gray, and Mick Warren, "Near Southside Historic District National Register of Historic Places Registration Form" *Historical Research Associates, Inc.*, (October 2003), 11.
[2] Ibid, 2.
[3] Ibid, 2.

blocks in these subdivisions were oriented parallel to the river, reflecting the original economic focus of the early township on river commerce and travel.[4]

Dakota Booms in Grand Forks
The following two decades saw Grand Forks and the Dakotas boom upon completion of the St. Paul, Minneapolis, and Manitoba Railway (later known as the Great Northern Railway) in 1880, which ran through the center of Grand Forks on its way west. In 1885, a north-south branch of the Northern Pacific railway was also completed, and a stop was made in Grand Forks on the way to Fargo and Moorhead. During this period, both railways actively promoted crop cultivation along their lines to improve agricultural output in the region and thus ensure future reliance on railroad commerce to ship goods across the country. The Northern Pacific and Great Northern Railways printed brochures and encouraged immigrant communities to build settlements along their existing rail lines. As a result, populations in towns like Grand Forks quickly ballooned leading into the twentieth century.

In 1883, the Dakota Territory Governor Nehemiah Ordway signed a measure authorizing the establishment of a university in Grand Forks. The act officially designated the college as the University of North Dakota in anticipation of separate statehood for North and South Dakota, which occurred in 1889. The original 20-acre parcel of land was originally improved with two buildings, the University Building and William Budge's shanty, which was converted into a bunkhouse and then barn.[5] The university became a focal point for the community as Grand Forks continued to develop towards the end of the nineteenth century.

Due to settlement campaigns by the Northern Pacific and Great Northern Railways, which distributed over 600,000 brochures promoting homesteaders to settle in the Red River Valley, the population of Grand Forks grew from 2,200 in 1883 to 6,516 in 1885.[6] To provide drinking water to the growing population, the original "Grand Forks Water Works Power House" (as it was originally named) was completed in 1885 within Viet's Addition amongst new residential buildings.[7] This original building was built in the Near Southside neighborhood largely populated by upper class family residences with ample community services available to nearby residences. The neighborhood had schools, a county courthouse, and one of the community's oldest churches. Residents included doctors, lawyers, financiers, politicians, newspaper executives, and local entrepreneurs.[8] The homes for these residents were built outside the floodplain of the Red River so spaces for industrial buildings, like the "Grand Forks Water Works Power House", could be accommodated.

---

[4] Ann Emmons and Jed Little, "Downtown Grand Forks Historic District National Register of Historic Places Registration Form," *Grand Forks Historic Preservation Commission,* (July 2005),18.
[5] Michelle L. Dennis, "University of North Dakota Historic District National Register of Historic Places Registration Form," *M. L. Dennis Consulting,* (October 2009), 20.
[6] Emmons and Little, "Downtown Grand Forks Historic District," 20.
[7] C. H. Hoper & Company, "Engineering Report: Rate Study and Economic Feasibility of Waterworks Improvement Program," *Utilities Engineers,* (February 1956), Section 3:1.
[8] Ann Emmons, Connie Walker-Gray, and Mick Warren, "Near Southside Historic District," 14.

After a brief lull in development during a national economic depression in the mid-1890s, the Enlarged Homestead Act of 1909 spurred another wave in westward settlement. This next wave, largely driven by immigrants looking to establish themselves in new territories, steadily grew the City of Grand Forks between 1910 and 1920. from 12,478 to 14,010.[9] At the same time, the City of Grand Forks worked to make significant improvements to its infrastructure, including the water treatment facility. *Grand Forks Herald* articles from the period suggest that upgrades to the plant were periodically proposed to keep up to date with modernizing standards in other nearby cities, such as Fargo, often by employing the help and expertise available at the University of North Dakota.[10] While the population continued to rise during the 1920s, the effects of a post-World War I agricultural depression began to be felt across the Midwest. The grain war relief which had kept demand for US agricultural products high, began a downward trend throughout the decade as European farms recovered. As a result, farmers, in-debt from longer term farm expansion loans, struggled to sell their surplus crops. This agricultural market collapse led to regional population shifts as rural families migrated into cities like Grand Forks.[11] By 1929, the population of Grand Forks had grown to 19,000.[12]

The Great Depression and WWII

Growth in Grand Forks was limited during the Great Depression and WWII. The construction of single-family residences slowed, and the development of the Grand Forks community largely stagnated. The Public Works Administration constructed South Junior High School in 1932.[13] However, the area around the school was not infilled until after the war. However, while the population of North Dakota dropped by roughly 5.7 percent during the Great Depression, Grand Forks grew by 18 percent due to continued migration from farm to city as the agricultural depression continued and drought worsened conditions for rural communities.[14]

As the proliferation of the automobile continued, the existing streetcar infrastructure was dismantled in 1934. Grand Forks became the intersection of two national roadways, US Route 2 (Roosevelt Highway) running east-west and US Route 81 (Meridian Highway) running north-south, originally on Belmont Road and turning northwest on South 5th Street. Commercial enterprises catering to this mobile population greatly expanded along the highway routes during this period.[15] On the eve of World War II, the city expanded the existing water treatment facility, then named the "City Water Works Pump House", dating to 1885.[16] The city constructed new buildings housing additional filters on the location of a

---

[9] "Encyclopedia of the Great Plains," University of Nebraska – Lincoln, last modified 2011, http://plainshumanities.unl.edu/encyclopedia/doc/egp.ct.025#:~:text=Regional%20wholesaling%20functions%20became%20significant,population%20to%20reach%2012%2C478%20people.
[10] "Grand Forks Water Works are Praised," *Grand Forks Herald*, Wednesday, May 3, 1922 (41:4).
[11] Emmons and Little, "Downtown Grand Forks Historic District," 24.
[12] Emmons, Walker-Gray, and Warren, "Southside Historic District,", 15.
[13] Ibid, 15-16.
[14] Emmons and Little, "Downtown Grand Forks Historic District," 24.
[15] Ibid, 24-25.
[16] Sanborn Fire Insurance Company, "1916 Sanborn Fire Insurance Map," *Grand Forks, Grand Forks County, North Dakota*, Sheet 20.

1-million-gallon reservoir on the southeast corner of Franklin Avenue and South 3rd Street. The 1939 changes to the plant resulted in the removal of the roofed reservoir building and the installation of two clearwells attached to the new treatment facility. It appears that the 1939 GFWTP was partially funded through the Public Works Administration (PWA), though no original blueprints were located for the addition. [17]

While no building layouts were located over the course of research, the new addition likely included additional laboratory space for bacteriological analysis along with purity and turbidity assessment, which had become commonplace in water treatment plants by 1939. From the 1930s through the 1950s, state and local health departments made significant progress in disease prevention activities. Chlorination, and softening systems were largely ubiquitous across the nation due to early twentieth century campaigns to improve public health and laboratories were needed to regularly test water conditions for the growing populace. Outbreaks of diseases like cholera, dysentery, tuberculosis, typhoid fever, yellow fever, and malaria, during the late nineteenth and early twentieth centuries in major US cities caused by inadequate public water supply and waste-disposal systems galvanized local governments to rapidly improve their public works, often with the assistance of Federal programs.[18] While the 1939 improvements to the GFWTP were important at the time, in 1968, all elements of the addition were removed and replaced for yet another improvement to the GFWTP to increase its capacity.

During WWII, wheat prices increased in the wake of the European shortage and farmers in North Dakota largely prospered. However, limits on wartime construction stifled expansion within the city's limits while the population continued to increase.[19] Expansion was slow and serious improvements to the GFWTP were not needed until the post-war period. Following the end of the war, vacant lots were quickly filled, and the footprint of the town expanded.

Post-war Development in Grand Forks

During the post-war period, migration from rural communities into larger cities continued and construction boomed across North Dakota cities. In 1953, US Route 81 was re-directed from Belmont Road to Washington Street, subsequently shifting the focus of travel westward along a new north-south route. The Washington Street corridor became a primary throughfare for travelers and garages, shopping centers, hotels, and new restaurants were constructed away from the historic center of the city to accommodate automobile traffic in the new decentralized western suburbs of the city.[20] In the late 1950s, Interstate 29 (originally Interstate 31 and before US Route 81) opened further west of

---

[17] "Water System Improvements – Grand Forks ND", The Living New Deal, Department of Geography, University of California Berkeley, last modified January 23, 2015, https://livingnewdeal.org/projects/water-system-improvements-grand-forks-nd/.

[18] "Achievements in Public Health, 1900-1999: Control of Infectious Diseases," Morbidity and Mortality Weekly Report, Centers for Disease Control and Prevention, last modified July 30, 1999, https://www.cdc.gov/mmwr/preview/mmwrhtml/mm4829a1.htm

[19] Ibid, 25.

[20] Ibid, 25-26.

downtown and it became the primary north-south route while the Washington Street corridor became the bus route for US Route 81. In addition, the Great Northern Railroads and the Northern Pacific Railway continued to operate in the area. Thus, new construction accelerated within expanding rings of suburbs while the City of Grand Forks cemented its role as a regional transportation hub for both roadway and railway traffic.

New suburbs in Grand Forks expanded westward and southward continuously between 1945 and 1970. Unlike larger US cities that experienced rapid suburbanization following the war and the proliferation of automobiles for American families, the new subdivisions of Grand Forks deviated less from established street grids and development patterns from the early twentieth century. Established local standards for urban expansion and the limited resources available to smaller municipalities like Grand Forks encouraged more conservative approaches to community developments. Unlike most suburban developments in larger cities during this period, established roadway arteries in Grand Forks suburbs were gradually extended and subdivisions remained small. At the same time however, newer suburban features becoming more common across the US, including curved streets, increased lot sizes, and a lack of intra-block alleyways, became prominent features of new Grand Forks developments. Therefore, new neighborhood plans featured a mix of commonly 'ideal' post-war suburban features to cater to new home types and neighborhood aesthetics, while also maintaining a limited cohesiveness with older downtown neighborhoods.[21]

As suburban growth in Grand Forks exploded, the US military began a build-up in the region during the Cold War. In 1954, the U.S. Air Force and the Department of Defense chose Grand Forks as the new site for an Air Force Base. Located 15 miles west of the city, construction on the Grand Forks Military Base commenced in 1956 and the base was fully operational by 1957.[22] In 1966, a Minuteman II missile complex became operational at the base. During this time, significant improvements were made to the GFWTP to accommodate the growing population of military personnel stationed at the base and the expansion of suburbanization in Grand Forks. In preparation for the opening of the air base, the U.S. Corps of Engineers proposed a watermain extension to the new site of the base in 1955, which was completed before a significant remodel of the GFWTP the following year.[23] Significant expansions and renovations of the plant occurred in 1956 and 1968. The Air Force Base was also crucial in adding a 1968 addition, partnering with the City of Grand Forks for the improvement project.

---

[21] William R. Caraher, Susan J. Caraher, "Report on the Windshield Survey of Midcentury Grand Forks Housing (1945-1970)," *Grand Forks Historic Preservation Commission*, (May 24, 2021), 4.
[22] Office of History, "History of Grand Forks Air Force Base and the 319th Air Refueling Wing," *319th Air Refueling Wing*, (December 31, 2003), 4.
[23] "Oscar Lunseth Papers, 1917-1972 Collection Overview," University of North Dakota Department of Special Collections Digital Finding Aids, Series 2: Box 8, Folder 6 (May 2, 1955).

During the 1969 flood of the Red River, National Guard troops worked with US military personnel at Grand Forks Air Force Base to construct sandbag dikes along the riverbanks and clear roadways once the water subsided. In 1997, Grand Forks Air Force Base personnel were instrumental in evacuating and sheltering citizens from the city during the Red River flood of 1997 before water levels reached their crest of 54'.

Grand Forks 1997 Flood

The Red River of the North regularly flooded over the course of Grand Forks' history. In 1897, the city experienced its most devastating flood that became the largest in the city's history for 100 years. Red River floods between 1897 and 1997 occurred in 1916, 1945, 1950, 1966, 1969, 1970, 1974, 1987, 1979, 1978, 1989, and 1996.

In anticipation of flooding due to large amounts of snowfall followed by high temperatures during the spring of 1997, military personnel from the Grand Forks Air Force Base constructed sandbag dikes based on a 49' estimate of river level rise. However, on April 18th, water broke through the emergency dikes and both Grand Forks and East Grand Forks began to experience substantial flooding. During the flood, a fire broke out in downtown Grand Forks, resulting in damage across three blocks and eleven buildings, including the *Grand Forks Herald* building, which was subsequently demolished. The GFWTP was flooded and rendered inoperable for 13 days following the flood. Roughly 46,000 people were evacuated from the area and roughly 75 percent of all homes in the city were damaged. In total, the flood caused approximately $3.5 billion in damage.[24]

The neighborhood immediately surrounding the GFWTP in Viet's Addition was severely impacted. Flooding damaged historic homes on Block 9 on the south side of 4th St south of the plant dating from the late nineteenth and early twentieth century. Five out of the six homes facing the GFWTP were demolished shortly after, and six new homes were constructed on those lots in 2014-15.

After the initial flooding, the citizens of Grand Forks were without running water for 13 days. The Pretreatment Facility (HAER No. ND-18-B) within the GFWTP was inundated with floodwater to a depth of roughly 9'. All equipment on the ground and basement levels required replacement or significant repair. The magnetic flow meter, clarifier, and detention sludge blowoff values and controls were all damaged. The generator room was inundated with flood water and rendered inoperable.[25]

The main Plant Complex of the GFWTP at 503 S. 4th St and 502 S. 3rd St was flooded to a depth of 9'. The boilers, high service pumps, air compressor/drying system, and motor control center were all significantly damaged and required replacement or repair. The basement area of the 1968 addition to the Plant Complex was flooded to 7'. The high service pump in this area of the plant, along with other crucial electrical and mechanical

---

[24] Alan Draves, "The 1997 Flood in Grand Forks North Dakota" accessed July, 2022, https://draves.com/gf/index.htm.
[25] Charles S. Vein, "Grand Forks Water Treatment Plant Flood Protection Plan," *Advanced Engineering & Environmental Services, Inc.*, (March 15, 1999), 8.

equipment were significantly damaged, necessitating complete replacement or significant repair. The Water Reclamation Facility (Lime Sludge Dewatering Plant) was flooded to 1.5'.[26]

Floodwater contaminated all three clearwells. The distribution system was also contaminated and not pressurized. However, after 13 days, emergency repairs were able to return the GFWTP to limited functionality. It then took significant flushing and testing of the system to ensure that the plant was producing potable water.[27] Therefore, it was not until 23 days after the flood when Grand Forks residents were able to drink piped water once again from the GFWTP.

Building History – The Grand Forks Water Treatment Plant

The original Grand Forks "Water Works Power House", as annotated in the 1888 Sanborn Map, for the City of Grand Forks was constructed in 1885 at 812 S. 3rd St on the northeast corner of the intersection of S. 3rd St and Franklin Ave. According to the 1888 Sanborn Fire Insurance Map, this single-story brick facility consisted of two "well hole" pumps, one Blake duplex pump, and one Knowles pump. The station had a wood frame woodshed attached to the rear and a storeroom at the northern end of the property. At that time Viet's Addition was sparsely populated with single-story and two-story family dwellings and associated outbuildings constructed with wood frames.[28] This area, on the edge of downtown was a known as a quiet neighborhood for some of the town's well-known upper-class families.

By 1892, the then named "City Water Works Pump House" was expanded. Expansions and modifications to the facility included a one-and-a-half story frame dwelling attached to the east side of the existing Pump House, an expansion/conversion to the woodshed into a fuel shed, and the installation of a new pump engine adjacent to the Blake duplex pump.[29] The 1897 map shows that a large brick structure housing the filter galleries and the clearwater reservoir was constructed south of the Pump House along 3rd street between Franklin and Minnesota Avenues. The brick structure was constructed with cement and brick, topped with a wood frame roof covered in tar and gravel. The neighborhood surrounding the Pump House also filled in with more two-story wood dwellings.[30]

By 1901, it appears that the City Water Works Pump House was either demolished or significantly remodeled in the same location following the Red River flood of 1897. The one-story brick building was expanded, the frame dwelling was completely removed, and a new frame fuel room at the rear was installed.[31] By 1906, it appears that the wood frame fuel shed was moved again and separated entirely from the City Water Works Pump House

---

[26] Ibid, 8.
[27] Ibid, 8-9.
[28] Sanborn Fire Insurance Company, "1888 Sanborn Fire Insurance Map," *Grand Forks, Grand Forks County, North Dakota*, Sheet 5.
[29] Sanborn Company, "1892," Sheet 7.
[30] Sanborn Company, "1897," Sheet 8.
[31] Sanborn Company, "1901," Sheet 8.

building. However, the brick building retained its footprint and was not significantly modified on the exterior. The brick and concrete reservoir building was annotated with a capacity of 1,000,000 gallons.[32] Six years later, in 1912, the next Sanborn map shows that a small portion of the reservoir roof was expanded to create a small second story pop-up called the filter house.[33] The last Sanborn map of the area, from 1916, does not show any significant changes to the reservoir, but the map shows that the City Water Works Pump House west wall was expanded for further concrete filter space.[34] The addition corresponds with *Grand Forks Herald* articles from the same time which discuss improvements to the water treatment plant and the addition of a water softening system.[35] However, the softening system addition was not accepted by the city until 1917.[36]

The original water treatment facility was expanded in 1939 and the filtration process of the plant was relocated to the southeast corner of S. 3rd St and Franklin Ave, where the brick and concrete reservoir building had been situated.[37] It's possible that the 1939 plant incorporated elements of the original building, though no floorplans were located for the 1939 replacement plant. The Public Works Administration supplied a $123,525 grant for the project, numbered PWA Docket No. NDX1191, which was completed between October 1938 and November 1939.[38] In 1968, all elements of the 1939 plant were removed and replaced by a new addition in the same location. Thus, limited information, besides historical photographs, remains to offer any insight into this nonextant structure.

In 1956, the Burns & McDonnell Engineering Company was commissioned by the City of Grand Forks and Mayor Oscar Lunseth to construct an addition to the south of the 1939 plant for additional softening and filter basins, a new clearwell, and a new administrative building. The 1956 addition project, led by engineer Allan H. Wymore and completed by the Eickhof Construction Company, incorporated the existing 1939 building and expanded the functionality of the plant while remodeling the exterior to match the new addition.[39] The 1956 construction campaign is considered to be the original construction date for the Grand Forks Water Treatment Plant (GFWTP).

That same year, a public works appropriation bill authorized land and funds for the construction of a new earthwork levee supported through Federal funding.[40] The Red River had experienced flooding in 1945 and 1950 and city officials, including Mayor Oscar Lunseth, were looking for solutions to the issue of regular flooding. However, even after

---

32 Sanborn Company, "1906," Sheet 8.
33 Sanborn Company, "1912," Sheet 9.
34 Sanborn Company, "1916," Sheet 20.
35 "Plan Accepted for Softening of City Water," *Grand Forks Daily Herald*, Friday, November 17, 1916 (36:1).
36 "Water Problem May Be Cared for Very Soon," *Grand Forks Herald*, Wednesday, February 7, 1917 (36:10).
37 C. H. Hoper & Company, "Engineering Report: Rate Study and Economic Feasibility of Waterworks Improvement Program," *Utilities Engineers,* (February 1956), Section 3:1.
38 University of California Berkeley, "Water Improvements – Grand Forks."
39 Burns & McDonnell Engineering Company "Water Works Improvements Contract No. 1 – Water Treatment Plant" *City of Grand Forks, North Dakota,* (1956), 1-3.
40 University of North Dakota, "Oscar Lunseth Papers," Series 2: Box 9, Folder 9 (July 9, 1956).

construction of the levee, Grand Forks still experienced periodic flooding over the second half of the twentieth century.

Mayor Oscar Lunseth had a family history directly tied to water purification and distribution for Grand Forks. Issues regarding water surrounded much of his life and work. He was the son of John Lunseth, who served as the City Superintendent of Water Works at the 1885 City Water Works Pump House. In 1912, Oscar Lunseth worked for Dakota Plumbing and Heating before founding Lunseth Plumbing and Heating with his brother in 1935. He served as alderman for Grand Forks from 1940 to 1952 and mayor from 1952 to 1960. The 1956 expansion of the GFWTP took place during his tenure as mayor. His correspondence with Burns & McDonnell and the Grand Forks Air Force Base during his time in office displays how he worked diligently to ensure that the new plant could meet the demands for both the City of Grand Forks and the Grand Forks Air Force Base. Water supply and water conservation continued to be an important issue for Oscar Lunseth even after his term as mayor. He was a member of the North Dakota State Water Conservation Commission, the Red River Basin Planning Committee, and the North Dakota Reclamation Association. In 1975, Oscar Lunseth was even given a "Service to Mankind Award" from the Sertoma Club for "his pioneering work in the field of water conservation and purity."[41]

After Oscar Lunseth's time in office ended in 1960, the remaining 1939 elements of the GFWTP were completely removed in 1968. A new clearwell and distribution shop was constructed at the corner of S. 3rd St and Minnesota Ave and new softening / filter basins replaced the existing filter systems in the northern part of the plant. The 1968 plant addition was built independent of the 1956 buildings with its own separate water treatment train featuring softening, re-carbonation, and filtration. This plant building incorporated a new garage, and high service pumping system from the new clearwell. Lime, soda ash, sodium aluminate feeds; along with lime softening basins; filters; and a high service line with a pump were all housed in this section of the plant. This addition was supported by the Grand Forks Air Force Base, which had grown rapidly since its initial construction and activation in 1957.[42]

In 1974, Grand Forks commissioned the construction of the Lime Sludge Dewatering Plant (later named the Water Reclamation Facility) to be built on the northeast corner of Franklin Ave and S. 3rd St, in the same location as the non-extant 1880s City Water Works Pump House. The new addition to the existing GFWTP was designed by architects Wells Denbrook Adams Inc., for the consulting engineers, K.B. MacKichan & Associates, Inc. The building featured a sludge pit, thickener, reception basin, vacuum filter, and clarifier for untreated water before it entered the pretreatment in the existing plant.[43] This building, also known as the Water Reclamation Facility, was removed in 2003, after an Interim

---

[41] "Oscar Lunseth Papers, 1917-1972 Collection Overview," University of North Dakota Department of Special Collections Digital Finding Aids, accessed July, 2022, https://apps.library.und.edu/archon/?p=collections/findingaid&id=358&q=.
[42] Fred Goetz and Ira Hill, Interview, July 13, 2022.
[43] K. B. MacKichan & Associates, Inc. Consulting Engineers, "Construction Plans for Lime Sludge Dewatering Plant," *Grand Forks, North Dakota*, City Project Mo. 2212, (1974), C-3.

Residuals Management project, which involved the construction of the new Raw Water Intake Facility and a Residual Pump Station, replaced the undersized residuals facility in the path of the newly proposed floodwall and the previous raw water intake along the Red River in East Grand Forks.[44] The 2003 Raw Water Intake building is now the only component of the GFWTP still in operation, pumping river water across the city to the new Water Treatment Plant at 955 S. 58th St, west of Grand Forks.

In 1984, the City of Grand Forks initiated another expansion for the existing plant, which included an extensive modernization of the 1956 facility and a new Pretreatment Facility constructed northwest of the 1956 and 1968 plant on the opposite side of Franklin Ave. The Pretreatment Facility featured influent piping, a detention basin, an aluminum sulphate and cationic polymer feed system, clarifiers, and recycle pumps/basin.[45]

The addition to the 1956 facility included adding two additional filters, a detention basin, a new clearwell, a chlorine storage room, and various personal areas. The project also included adding a 500,000 gallon recycle storage basin; the installation of new high service pumping system; the conversion of the existing 1956 and 1968 pretreatment basins to softening basins; and upgrades to existing softening, filtration, chemical feed, and HVAC systems.[46] Following the 1984 remodel, the 1956 building complex and 1984 additions housed ozone basins, a lime storage and transfer system, a fluoride feed, a lime feed, a soda ash feed, lime softening basins, re-carbonation basins, a CO2 system, filters, a chlorine system, and an ammonia system.[47]

Systems across the GFWTP were updated in 1994 to comply with the first Surface Water Treatment Rule (SWTR) issued by the EPA in 1989, which included improvements to the disinfection process, the installation of new process piping, upgrades to the filter controls, the installation of an on-site generator, and the installation of the newly automated controls for disinfection and filter systems. Shortly after the improvements, the 1997 Flood necessitated further improvements and repairs across the plant. A new Raw Water Intake Facility at 600 S. 3rd St, which was placed into service in the fall of 2004, replaced the existing intake facility located along the Red River in East Grand Forks; the Interim Residuals Management project rendered the 1974 Water Reclamation Facility redundant; and a new high service pump station addressed system service limitations to the southwest portions of the city.[48]

---

44 Judel Buls and Wayne L. Gerszewski, "Grand Forks Water Treatment Plant Evaluation," *Advanced Engineering and Environmental Services, Inc.*, (August 31, 2008), 6.
45 KBM, Inc. "Construction Plans for Water Treatment Plant Modification & Expansion," *Grand Forks, North Dakota,* City Project No. 2995, (1984), C-1-2.
46 Judel Buls and Wayne L. Gerszewski, "Grand Forks Water Treatment Plant Evaluation," *Advanced Engineering and Environmental Services, Inc.*, (August 31, 2008), 5-6.
47 KBM, Inc. "Construction Plans for Water Treatment Plant Modification & Expansion," *Grand Forks, North Dakota,* City Project No. 2995, (1984), C-1-2.
48 Judel Buls and Wayne L. Gerszewski, "Water Treatment Plant Evaluation," 5-6.

After 1997, few changes were made to the exterior or interior functions of the GFWTP apart from the construction of the Residual Pump House in 2003 northeast of the Pretreatment Facility. In 2008, Advanced Engineering and Environmental Services, Inc. conducted an evaluation of the plant's functionality and ultimately concluded that the GFWTP was in poor condition and did not efficiently treat water in comparison to available technology. Therefore, they recommended that the process be entirely replaced in the long term due to hydraulic bottlenecks effecting treatment capacity, aging softening basins, improper filter configuration, piping corrosion, and old instrumentation at the end of its life cycle.[49]

[49] Ibid, 25-26.

PART II. STRUCTURAL/DESIGN/EQUIPMENT INFORMATION

GRAND FORKS WATER TREATMENT PLANT (HAER No. ND-18)

General Statement: The GFWTP includes the Plant Complex, a Pretreatment Facility, and a Residual Pump Station. The primary building materials are brick, concrete, steel, and concrete cinderblock.

Plant Complex (HAER No. ND-18-A): 502 South 3rd Street and 503 South 4th Street

Architectural Character: Late Modern

Condition of Fabric: The building is in good condition on the exterior and fair to poor condition on the interior. The building, equipment, and features on the exterior are still intact. In 1997, the plant was rehabilitated following a major floor which partially inundated the lower levels of the building. Older sections of the Plant Complex interior from 1956 and 1968 show signs of spalling concrete, leaking, and structural damage associated with the age of the facility. Following decommission in 2020, the interior of the Plant Complex has sustained damage related to local police training, which involved live-fire exercises.

Description of Exterior:

Overall Dimensions: The overall dimensions for the Plant Complex are roughly 295' x 256'.

Foundations: The Plant Complex has a concrete slab foundation with steel supportive beams and concrete lined basement.

Walls: Exterior walls of the building is clad with brick and mortar on top of concrete, steel, and cinderblock framing materials. The brick clad structure features a running bond. Above the center of the main entrance that faces S. 4th St at the corner of 4th St and Franklin Ave, there is a vertical stripe of white marble blocks that lead to the parapet wall on the roof. Below a window in the center of the southeast elevation there are brown painted vertical metal boards and above the window is a stripe of marble blocks that extend to the roofline. To the east of the window there is a concrete framed connector that extends to the corner of the 'L' shaped façade.

Structural system, framing: The building is framed with concrete, cinderblock, and steel beam framing materials.

Porches, stoops, balconies, bulkheads: The Plant Complex features a concrete stoop at the front entrance and a concrete ramp with a landing on the northeast elevation.

Openings:

Doorway/doors: All doors on the property besides the front doors on S. 4th St are non-historic metal doors with no ornamentation. The metal front doors likely date to 1956, when the mass at the front entrance to the plant was initially constructed after the older sections were demolished.

The western corner of the southwest elevation has a three-story symmetrical mass that dates to 1956 that is set back from the street at the top of a concrete staircase. The front doors are metal framed with two square panels and the top panels on each of the double doors are filled with single square lights. The southwest elevation of the building continues from the mass at the front entrance southward along 4th St on a single-story section of the building that is asymmetrical. From the entrance mass, there are a pair of metal double doors, one metal door with a rectangular top panel window, a solid metal door, a large metal double door with a steel beam extending out over the top of the entrance, two more solid metal doors, and a large brown painted vinyl loading bay door.

The northeast elevation is asymmetric with two brown vinyl loading bay doors at the east corner, both accessible via a concrete semi-circle ramp and driveway, with a small solid metal door adjacent to the door at the top of the ramp.

The northwest elevation is comprised of a single-story façade with a basement towards the north end of the elevation, a center two-story façade with a connection to the walkway over Franklin Ave, and façade comprised of three stories at the western end of the elevation. The northernmost portion of the elevation features two metal doors on the basement level, one a set of double doors and the other a single solid door. Where the elevation increases to three stories, there is a vinyl loading bay door on the ground level.

Windows: All windows across the GFWTP are square hopper windows apart from a tripartite metal framed window on the southeast elevation.

The front doors at the west corner of the southwest elevation are surrounded by large rectangular metal plates with aluminum frames. There are single panels on either side of the doors and four panels above. On either side of the door are small square metal framed hopper windows on the ground floor. The single-story section of the southwest elevation has a row of three-square metal framed hopper windows and four louvred vents.

The southeast elevation has a tripartite metal framed fixed window in the center of the setback façade behind the underground clearwell with vertical rectangular lights. To the east of the window is a small square metal vent and a square hopper window with a metal frame. The next mass of the southeast elevation faces southwest and only features one vent in the brick façade. The easternmost façade of the building faces southeast. The single-story façade only features two metal vents near the ground at the center of the façade that sits closest to Minnesota Ave.

A small louvred metal vent on the northeast elevation sits close to the loading bay door near the ground and another vent is located further north along the elevation where the single floor elevation raises in height. No other features are present along the northeast elevation apart from a metal circular exhaust vent in the concrete sheathing.

The northernmost portion of the northwest elevation features a metal vent on the first floor above the two metal doors on the basement level. Adjacent to the walkway on the second floor are two metal vents above three evenly spaced square hopper windows along the ground floor. Where the elevation increases to three stories, a rectangular vent, two metal framed square hopper windows, and a painted metal vent at the ground level. At the corner of the northwest elevation closest to the front entrance, there are three vertical bays with square hopper windows equally spaced on each floor, with a total of nine windows. Adjacent to the rows of windows, there is a large circular exhaust vent on the ground level.

Roof: The roof is flat with a short parapet wall that is clad in tar and gravel.

Description of Interior:

Floor Plans: The first floor of Plant Complex contained two self-contained plants, one built in 1956 and one built in 1968. The first floor of both plants was the main operating floor. In the 1956 plant, the westernmost corner of the building housed the labs, offices, bathrooms, a conference room, and a lunchroom around the main entrance to the building. The chemical transfer room, a shop, and the intermediate basin bordered the northeast wall. The center of the first floor contained the four softening basins in a large open room adjacent to a filtration tank gallery room to the southeast. The chlorine tank room, carbon dioxide storage room, and the high service pump rooms were located along the southwest wall, occupying the rooms with entrances out onto the ground level of S. 4th St.

In the 1968 plant, two softening basins were in the northernmost corner of the Plant Complex along the northeast wall followed by two re-carbonation basins, and a detention basin. The filter basin was in the center of the plant and a high service pump room was located adjacent to the filter basin. A storage and vehicle parking area for both plants was on the first floor above a clearwell in the east corner of the Plant Complex. The second floor featured a chemical storage area, an area for lime and soda ash bins that continued from above and terminated on the first floor, the blower room for lime and soda ash, and the phosphate and fluoride injection room. The third floor featured the tops of the lime and soda ash bins, chemical storage space and an elevator which serviced all floors below. The basement included a boiler room and a pump room for additional high service pumps.

Work Flow: In the Plant Complex (HAER No. ND-18-A), lime, soda ash, and sodium aluminate transfer systems fed chemicals into the water as it entered the softening basins. After passing through the softening basins, water was re-carbonated with carbon dioxide as it entered further detention basins. After passing through re-carbonation, water entered the disinfection process. In this phase, chlorine and ammonia formed a chloramine in the water to be filtered in the next process. In the filtration tanks, catalytic carbon filtration reduced the level of chloramines in the water to safe levels. On the way out of the filtration tanks, fluoride and phosphate were added to the water before it moved on to storage in the three clearwells. From there, clean water was sent out to the city directly via high service water pumps.

Stairways: A center stairwell was adjacent to the men's bathroom on the first floor which extended from the basement to the roof. The stairway had grated metal steps and round metal pipe railing. Two smaller stairways to lower levels were located throughout the Plant Complex following a similar design.

Flooring: Flooring material consisted of poured concrete, masonry tiles, linoleum tiles, and carpeting.

Walls and Ceiling Finish: Walls were largely painted cinderblock with drywall in office and laboratory spaces. Ceilings consisted of exposed metal support beams and polystyrene ceiling tiles in office spaces.

Pretreatment Facility (HAER No. ND-18-B): 412 South 3rd Street

Architectural Character: Late Modern

Condition of Fabric: The building is in good condition on the exterior and fair condition on the interior. In 1997, the plant was rehabilitated following a major floor which partially inundated the lower levels of the building. The building, equipment, and features on the exterior are still intact. Following decommission in 2020, the interior of the Pretreatment Facility has sustained damage related to local police training, which involved live-fire exercises.

Description of Exterior:

Overall Dimensions: The overall dimensions for the Pretreatment Facility at 412 S 3rd St is roughly 146′ x 85′.

Foundations: The Pretreatment Facility has a concrete slab foundation with steel supportive beams and concrete lined basement.

Walls: Exterior walls of the Pretreatment Facility are clad with brick and mortar on top of concrete, steel, and cinderblock framing materials. The brick features a running bond. The Pretreatment Facility features a soldier course across the top half of the structure.

Structural system, framing: The building is framed with concrete, cinderblock, and steel beam framing materials. The two-story covered walkway is supported by a single concrete column.

Porches, stoops, balconies, bulkheads: There is a second-floor balcony on the northeast elevation in the northern corner of the building. The balcony offers access to the tar and gravel flat roof.

Openings:

Doorway/doors: All doors on the Pretreatment Facility are non-historic solid metal doors with no ornamentation.

The southwest elevation of the Pretreatment Facility on Block 5 at 412 S. 3rd St features a two-story asymmetrical brick façade with little to no ornamentation. The northernmost corner of the southwest elevation has a vertical bay. Adjacent to this bay on the northern half of the elevation is another bay that extends forward from the primary mass of the building featuring one steel door on the ground level.

The southeast elevation has a two-story asymmetrical brick façade with few features. At the southern corner of the elevation, a bay with a shorter parapet wall roof that extends forward from the primary mass of the building features one steel door on the ground level. At the eastern corner, a concrete ramp leads up to a brown painted vinyl loading bay door and a steel door that face southwest on a two-story bay that extends forward from the primary mass of the building to connect to the covered walkway that extends over Franklin Ave. On the northeastern side of the bay, there is another brown vinyl loading bay door on the ground level. Above the two-story bay and the walkway at the east corner of the southeast elevation is a third-story mass that extends along the northwest elevation with one solid metal door over the walkway on the southeast elevation.

The northeast elevation has a two-story asymmetrical brick façade with few features apart from the northernmost part of the elevation, which has a single-story bay set back from the rest of the façade with a steel door that opens out onto the roof.

The northwest elevation has a single steel door on the ground level of the one-story bay on the northern end that wraps around to the northeast.

Windows: The Pretreatment Facility at the GFWTP does not feature any windows, only metal louvred vents.

The northernmost corner of the southwest elevation has a vertical bay with two vents, one per story above one another, filed with horizontal steel louvres. Most of the façade is plain with only brick siding until there are two more steel vents in the southernmost corner that are located above one another on the first and second floors.

The southeast elevation only features one louvred metal vent above the two-story bay and the walkway at the east corner of the southeast elevation. On the northeastern side of the bay that connects to the walkway, there is a small louvred vent adjacent to the brown vinyl loading bay door on the ground level facing northeast.

The northeast elevation features three louvred vents, two large rectangular vents and one smaller vent on the central mass of the building towards the northern end.

The northwest elevation of the building features no vents or windows.

Roof: The roof is flat with a short parapet wall that is clad in tar and gravel.

Description of Interior:

Floor plans: The first floor of the Pretreatment Facility contained the carbon feeder room, a storage room, control room, bathrooms, and an elevator along the northeast wall. A large open room in the center of the facility held the larger clarifier, or pulsator, tanks surrounded on three sides by raised concrete mezzanine walkways. Along the northwest wall, there was a long rectangular chemical feed room and a vacuum pump room. Above the first-floor rooms along the northeast wall, the second-floor mass contained a foyer space connected to the walkway, an elevator entrance, and a large carbon storage room. Beneath the first floor along the northeast wall, an intermediate floor between the operating floor and the basement level contained an elevator entrance, electrical room, and a large open chemical storage space. The stairway and elevator in the east corner led down to the basement level which contained another large storage space, an elevator equipment room, and corridors leading to pipe galleries on the southeast and northwest sides of the pulsator tanks.

Work Flow: In the Pretreatment Facility, raw water was treated with carbon and then collected into the detention basins. In the detention basins, water was treated with aluminum sulfate and cationic polymers to clump together and settle organic solids, forming a sludge at the bottom of the basins. Following the detention basins, water was separated into sludge pits and the clarifiers, or pulsators. The pulsators removed solid particles from the water and the separated water continued to the treatment plant.

Stairways: A metal staircase adjacent to the elevator in the east corner of the building provides access from the basement to the second floor. It has metal steps and metal pipe railing. Additional metal stairways constructed in the south and west corners of the building provide access to the basement and operating room mezzanine walkways around the pulsators.

Flooring: Flooring material consisted of poured concrete throughout the majority of the Pretreatment Facility and linoleum tiling in the control and lab room spaces.

Walls and Ceiling Finish: Walls were largely painted cinderblock with drywall in office and laboratory spaces. Ceilings consisted of exposed metal support beams and polystyrene ceiling tiles in office spaces.

Residual Pump Station (HAER No. ND-18-C): 412 South 3rd Street

Architectural Character: Late Modern

Condition of Fabric: The 2003 Residual Pump Station is in good condition on the exterior and good condition on the interior.

Description of Exterior:

Overall Dimensions: The overall dimensions of the Residual Pump Station are roughly 33' x 33'.

Foundations: The Residual Pump Station has a concrete slab foundation with steel supportive beams and concrete lined basement.

Walls: Exterior walls of the Residual Pump Station are clad with brick and mortar on top of concrete, steel, and cinderblock framing materials. The brick features a running bond with two soldier courses, one at the roofline and one at ground level.

Structural System, Framing: The building is framed with concrete, cinderblock, and steel beam framing materials. The two-story covered walkway is supported by a single concrete column.

Porches, Stoops, Balconies, Bulkheads:

Openings:

Doorway/doors: This windowless one-story building features a metal staircase leading up to a solid metal door. On the northeast elevation there is a large metal double door with a steel beam extending out over the top of the entrance of a loading bay.

Windows: The one-story building features a square louvred metal vent on the southeast elevation adjacent to a solid metal door. The northwest elevation features one small louvred vent towards the north side of the façade.

Roof: The roof is flat with a short parapet wall that is clad in tar and gravel.

Work Flow: After water in the Pretreatment Facility was treated with aluminum sulfate and cationic polymers, the resulting sludge was piped to a basin beneath the Residual Pump Station, where the sludge was sent out to the Grand Forks Sewage Disposal Ponds located northwest of the City of Grand Forks.

Site Layout: The buildings are located on Blocks 5 and 8 in Viet's Addition. They occupy the addresses 412 S. 3rd St, 502 S. 3rd St, and 503 S. 4th St with irregular rectangular floorplans situated in a northwest to southeast orientation, with a second-story walkway over Franklin Ave connecting the Plant Complex to the Pretreatment Facility.

PART III. OPERATIONS AND PROCESS

Operations: The following information was collected via a joint informal interview with Fred Goetz, the Water Treatment Plant Supervisor and Ira Hill, a lead Water Treatment Plant Operator. They discussed the operation of the GFWTP, and the chemicals used in the process until the facility was decommissioned in 2020.[50]

At the time the plant was decommissioned in 2020, the GFWTP received raw water into the Pretreatment Facility from a 2003-04 Raw Water Intake Facility (out of scope) at 600 S. 3rd St. From the Raw Water Intake Facility, piping ran northwest under S. 3rd St and 4th St to the Pretreatment Facility, where raw water was treated with carbon and then collected into the detention basins. In the detention basins, water was treated with aluminum sulfate and cationic polymers to clump together and settle organic solids, forming a sludge at the bottom of the basins. Potassium permanganate was also used in this process for an extended trial period in the 1980s and 1990s to remove iron and manganese from water. However, since the Red River was the main source of water for the community, levels of iron and manganese were lower than other groundwater sources where the chemical is more widely used in the water treatment process. Following the detention basins, water was separated into sludge pits and the clarifiers, or pulsators. The pulsators removed solid particles from the water and the separated water continued to the treatment plant. Sludge moved to a basin beneath the Residual Pump Station (HAER No. ND-18-C) before being pumped out to the Grand Forks Sewage Disposal Ponds.

Before the Red River Flood of 1997, the 1974 Water Reclamation Facility, which was demolished in 2005 in preparation for the permanent floodwall, received sludge from the Pretreatment Facility. After the Water Reclamation Facility was decommissioned, the small Residual Pump Station (HAER No. ND-18-C) was constructed adjacent to the Pretreatment Facility (HAER No. ND-18-B) to pump residual sludge byproduct away from plant to the Grand Forks Sewage Disposal Ponds northwest of the city in 2003.

Pretreated water exited the Pretreatment Facility (HAER No. ND-18-B) to the ozone basins in the Plant Complex, which housed original 1956 plant with a 1984 addition and the 1968 plant. The ozone basins only briefly utilized ozone in a trial period and largely served as pretreatment basins before the Pretreatment Facility was completed in 1984. Afterwards, they simply served as intermediate basins. From the intermediate basins, water usually flowed through the filtration process in the 1956/1984 system, bypassing the 1968 addition, which housed a completely separate plant that was chiefly operated from May through October.

---

[50] Fred Goetz and Ira Hill, Interview, July 13, 2022.

In the Plant Complex (HAER No. ND-18-A), lime, soda ash, and sodium aluminate transfer systems fed chemicals into the water as it entered the softening basins. After passing through the softening basins, water was re-carbonated with carbon dioxide as it entered further detention basins. After passing through re-carbonation, water entered the disinfection process. In this phase, chlorine and ammonia formed a chloramine in the water to be filtered in the next process. In the filtration tanks, catalytic carbon filtration reduced the level of chloramines in the water to safe levels. On the way out of the filtration tanks, fluoride and phosphate were added to the water before it moved on to storage in the three clearwells. From there, clean water was sent out to the city directly via high service water pumps.

Between May and October, water also passed through the 1968 addition of the Plant Complex (HAER No. ND-18-A) in a limited capacity, which operated as its own separate plant. In the 1968 plant, lime, soda ash, and sodium aluminate were fed into water coming from the Pretreatment Facility. The treated water entered softening basins before being re-carbonated and transferred to a detention basin for disinfection following the same process as the 1956/1984 plant. After time in the detention basin, the treated water entered the filters, where it then flowed into one of the two clearwells before being fed to the high service pumps. The same chemicals were used throughout the treatment process in the 1968 plant in a smaller capacity.

Technology: Below is a detailed list of the chemicals used in order throughout the entire water treatment process at the GFWTP. The list includes a description of the storage, dispersal systems, and effects of each chemical on the water to improve purity and decrease turbidity (level of cloudiness). Chemicals used in the facility evolved over time. As a result, existing spaces throughout the GFWTP were continuously adapted for new purposes and additions changed the locations of where certain chemicals were introduced and stored. This list is meant to reflect the chemicals used in the years immediately before the plant was decommissioned.

<u>Powdered Activated Carbon</u> was added to raw water received from the Raw Water Intake building located southeast of the GFWTP. The powdered carbon, which was stored in the Pretreatment Facility on pallets on the second floor, was fed into the treatment train via carbon injection systems attached to hoppers on the first floor.

First introduced as part of the water treatment process in the US in 1930, powdered carbon helped to ensure that water was odorless and free from most harmful contaminants such as pesticides, endocrine disruptors, and pharmaceutical products. Blueprints from the GFWTP show that powdered activated carbon was being used by 1956, if not earlier, as it was utilized widely throughout the country by the mid-twentieth century. In the GFWTP, carbon was removed later along with other solids by the pulsators before water exited the Pretreatment Facility.

Aluminum Sulfate (also known as alum), which was stored in 7,000-gallon storage tanks in the chemical feed room the was fed via pumps and an injection system in liquid form to the raw water treatment train piping before it entered the pulsators to reduce the amount of phosphorus in the water. The alum formed a fluffy aluminum hydroxide once combined with water called floc. The floc then settled at the bottom of the detention basin and was removed to sludge pits on the way to the Residual Pump Station. In the GFWTP, alum was being used by 1956.

Cationic Polymers, stored in liquid solution tanks, were also used to clump floc together and create a coagulant that helped settle organic solids in the raw water to the bottom of the pulsators. The polymer solution was added to the raw water treatment train, along with the alum, via a pumping an injection system in the chemical feed room. The polymers created negative charged particles that facilitated floc settlement before the clarified water on top was moved out of the Pretreatment Facility. Synthetic polymers were first introduced into water treatment during the 1950s. By 1984, the GFWTP used cationic polymers in the pretreatment process.

Lime was used in the softening process to remove calcium and magnesium ions. The lime dust was stored in large drums on the fourth floor of the Plant Complex. It was fed into hoppers on the floor below and blowers in the transfer room, or chemical feed room, which then sent lime dust down transfer piping into the softening bins. The lime raised the pH level, removed turbidity (level of cloudiness) from clarified water, and created calcium carbonate, which settled at the bottom of the softening basins.

Lime softening, first introduced in 1841 in London, was widely used across the US by the early 1900s. Lime softening was used at the original City Works Pump House by 1918 and was upgraded in and integrated into 1939 and 1956 additions to the GFWTP.

Soda Ash (also known as sodium carbonate) worked with lime to raise the pH level of acidic water coming from the Pretreatment Facility and remove the non-carbonate harness of the water. Soda ash was stored alongside lime on the fourth floor of the Plant Complex. The soda ash followed the same distribution system as lime dust and was added at the same time during the softening process into the basins.

The use of soda ash in water softening was also introduced during the same timeframe as lime. It was used both in the City Works Pump House and the GFWTP.

Sodium Aluminate was used as another coagulant to remove more remaining suspended solids during the softening process, including metals and dissolved silica, known as pin-floc. Sodium aluminate dust was also stored on the fourth floor, fed into a hopper, and added alongside lime and soda ash into the softening basins via transfer piping.

Sodium aluminate for coagulation became widespread in the US by the mid-twentieth century. A sodium aluminate feeder and transfer equipment were installed in the GFWTP by 1984.

Carbon Dioxide was used to lower the high pH level caused by the lime. After softening, the water was re-carbonated to normalize the pH level once again. Carbon dioxide was stored in a 26-ton storage tank on the ground level of the Plant Complex along S. 4th St. The tank fed the gas into each of the four detention basins for re-carbonation. The process of re-carbonation was introduced after softening became a common practice in water treatment to reduce the pH of softened water. Re-carbonation became a common part of the water treatment process by 1956 but may have been utilized earlier in the twentieth century.

Chlorine and Ammonia were added to kill any remaining parasites, bacteria or viruses left after the softening and re-carbonation. The chlorine and ammonia were both injected into detention basins for disinfection. The chlorine was stored in the chlorine room along S. 4th St in large cylindrical tanks. The chemicals together formed a chloramine. Catalytic carbon filtration in the filtration tanks reduced the level of chloramines in the water to safe levels.

The use of chlorine to disinfect water became common practice around the beginning of the twentieth century. It was used in the GFWTP by 1956 but was likely used before when the 1939 addition was added.

Fluoride was added to the newly disinfected water to prevent tooth decay. Fluoride and phosphate were introduced into the treatment train via a chemical feeder on the third floor of the Plant Complex and then pumped down to the treated water lines entering the clearwells.

Fluoride was first introduced to the drinking water of a major American city, Grand Rapids, in 1945 to reduce tooth decay. After 11 years, the cavity rate of children dropped by more than 60 percent.[51] By 1960, most water treatment plants were regularly introducing fluoride into purified and disinfected water. By 1956, the GFWTP used fluoride in the treatment process.

Phosphate was also introduced with fluoride to prevent corrosion of metal in water pipe work systems and lead poisoning. Fluoride and phosphate were both mixed into a chemical solution diffuser that injected the solution into the piping train.

[51] "The Story of Fluoridation," National Institute of Health, National Institute of Dental and Craniofacial Research, last modified 2018, https://www.nidcr.nih.gov/health-info/fluoride/the-story-of-fluoridation

After fluoride and phosphate were introduced, water moved throughout the three clearwells, which held 1.5 million gallons of water combined.

In 1974, Congress passed the Safe Drinking Water Act to regulate the quality of the US drinking water supply. In 1991, the EPA published the Lead and Copper Rule under the Safe Drinking Water Act. During the 70s and 80s, water treatment plants across the country began to update their systems to prevent corrosion and lead poisoning using phosphate. By 1984, the GFWTP was using phosphate along with fluoride at the end of the treatment process.

PART IV. SOURCES OF INFORMATION

Bibliography

Buls, Judel, and Gerszewski, Wayne L.
"Grand Forks Water Treatment Plant Evaluation." *Advanced Engineering and Environmental Services, Inc.*, (August 31, 2008).

Burns & McDonnell Engineering Company
"Water Works Improvements Contract No. 1 – Water Treatment Plant." *City of Grand Forks, North Dakota*, (1956).

Caraher, William R. and Caraher, Susan J.
"Report on the Windshield Survey of Midcentury Grand Forks Housing (1945-1970)." *Grand Forks Historic Preservation Commission*, (May 24, 2021).

Centers for Disease Control
"Achievements in Public Health, 1900-1999: Control of Infectious Diseases." Morbidity and Mortality Weekly Report. Last modified July 30, 1999. https://www.cdc.gov/mmwr/preview/mmwrhtml/mm4829a1.htm

C. H. Hoper & Company
"Engineering Report: Rate Study and Economic Feasibility of Waterworks Improvement Program." *Utilities Engineers*, (February 1956).

Dennis, Michelle L.
"University of North Dakota Historic District National Register of Historic Places Registration Form." *M. L. Dennis Consulting*, (October 2009).

Draves, Alan
"The 1997 Flood in Grand Forks North Dakota." Accessed July, 2022. https://draves.com/gf/index.htm.

Emmons, Ann, Walker-Gray, Connie, and Warren, Mick
"Near Southside Historic District National Register of Historic Places Registration Form." *Historical Research Associates, Inc.*, (October 2003).

Emmons, Ann and Little, Jed
"Downtown Grand Forks Historic District National Register of Historic Places Registration Form." *Grand Forks Historic Preservation Commission*, (July 2005).

K. B. MacKichan & Associates, Inc. Consulting Engineers
"Construction Plans for Lime Sludge Dewatering Plant" *Grand Forks, North Dakota*, City Project No. 2212, (1974).

KBM, Inc.
"Construction Plans for Water Treatment Plant Modification & Expansion." *Grand Forks, North Dakota,* City Project No. 2995, (1984).

National Institute of Health
"The Story of Fluoridation." National Institute of Dental and Craniofacial Research. Last modified 2018. https://www.nidcr.nih.gov/health-info/fluoride/the-story-of-fluoridation.

NewsBank Inc.
"Plan Accepted for Softening of City Water," GenealogyBank, *Grand Forks Daily Herald*, November 17, 1916. Accessed July, 2022. https://www.genealogybank.com/

"Water Problem May Be Cared for Very Soon" *Grand Forks Herald*, February 7, 1917.

"Grand Forks Water Works are Praised" *Grand Forks Herald*, May 3, 1922.

Office of History
"History of Grand Forks Air Force Base and the 319th Air Refueling Wing." *319th Air Refueling Wing,* (December 31 2003).

Sanborn Fire Insurance Company
"Sanborn Fire Insurance Maps." *Grand Forks, North Dakota,* Sheets 5, 7, 8, 9, 20, (1888, 1892, 1897, 1901, 1906, 1912, 1916).

University of California Berkeley
"Water System Improvements – Grand Forks ND." The Living New Deal. Department of Geography. Last modified January 23, 2015, https://livingnewdeal.org/projects/water-system-improvements-grand-forks-nd/.

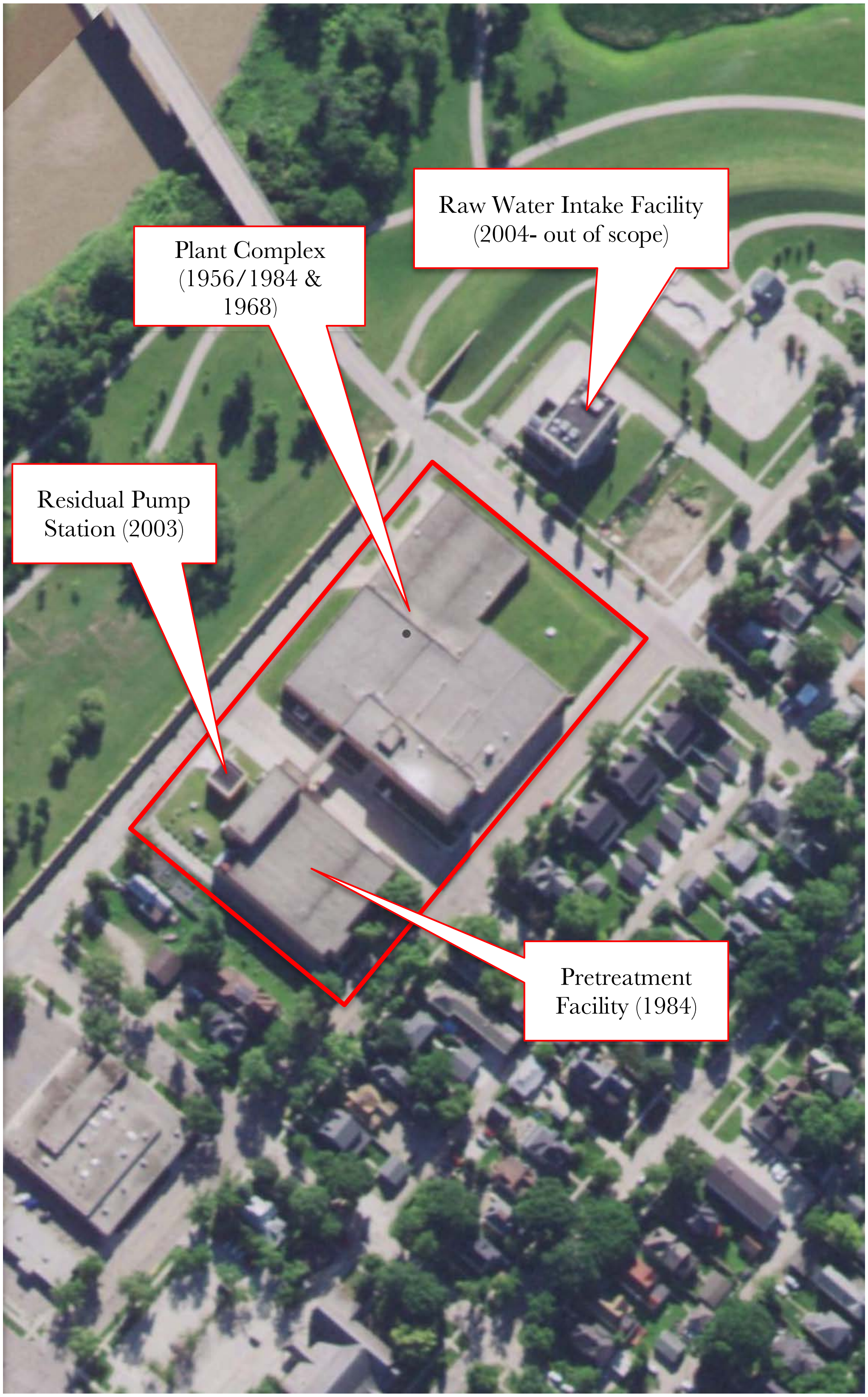
University of Nebraska – Lincoln
"Encyclopedia of the Great Plains." University of Nebraska – Lincoln. Last modified 2011.http://plainshumanities.unl.edu/encyclopedia/doc/egp.ct.025#:~:text=Regional%20wholesaling%20functions%20became%20significant,population%20to%20reach%2012%2C478%20people.

University of North Dakota
"Oscar Lunseth Papers, 1917-1972 Collection Overview." University of North Dakota Department of Special Collections Digital Finding Aids, Accessed July, 2022. https://apps.library.und.edu/archon/?p=collections/findingaid&id=358&q=.

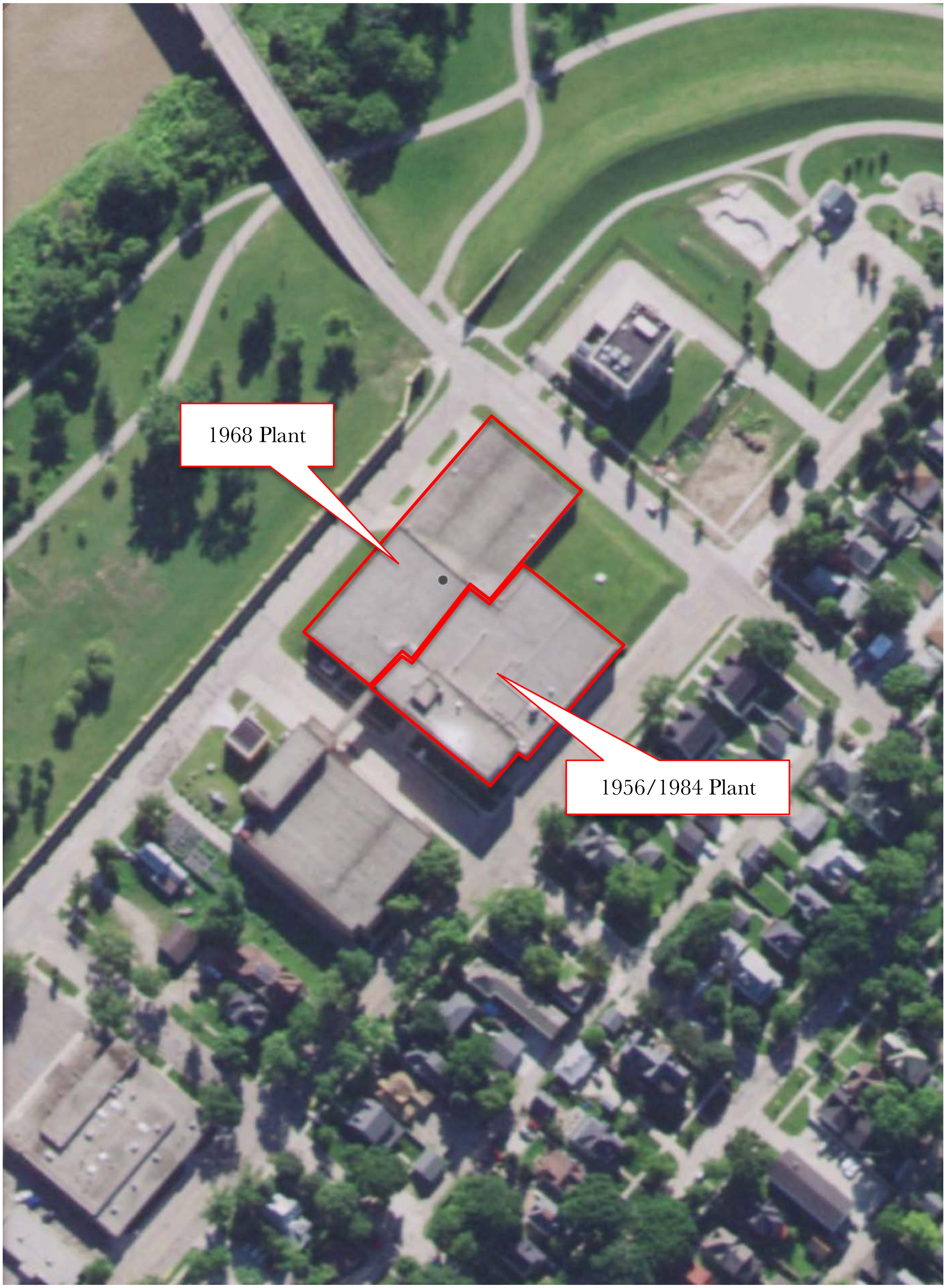
Series 2: Box 8, Folder 6 (May 2, 1955).

Vein, Charles S.
"Grand Forks Water Treatment Plant Flood Protection Plan" *Advanced Engineering & Environmental Services, Inc.*, (March 15, 1999).

PART IV. SUPPLEMENTAL MATERIAL
Grand Forks Water Treatment Plant, USGS:

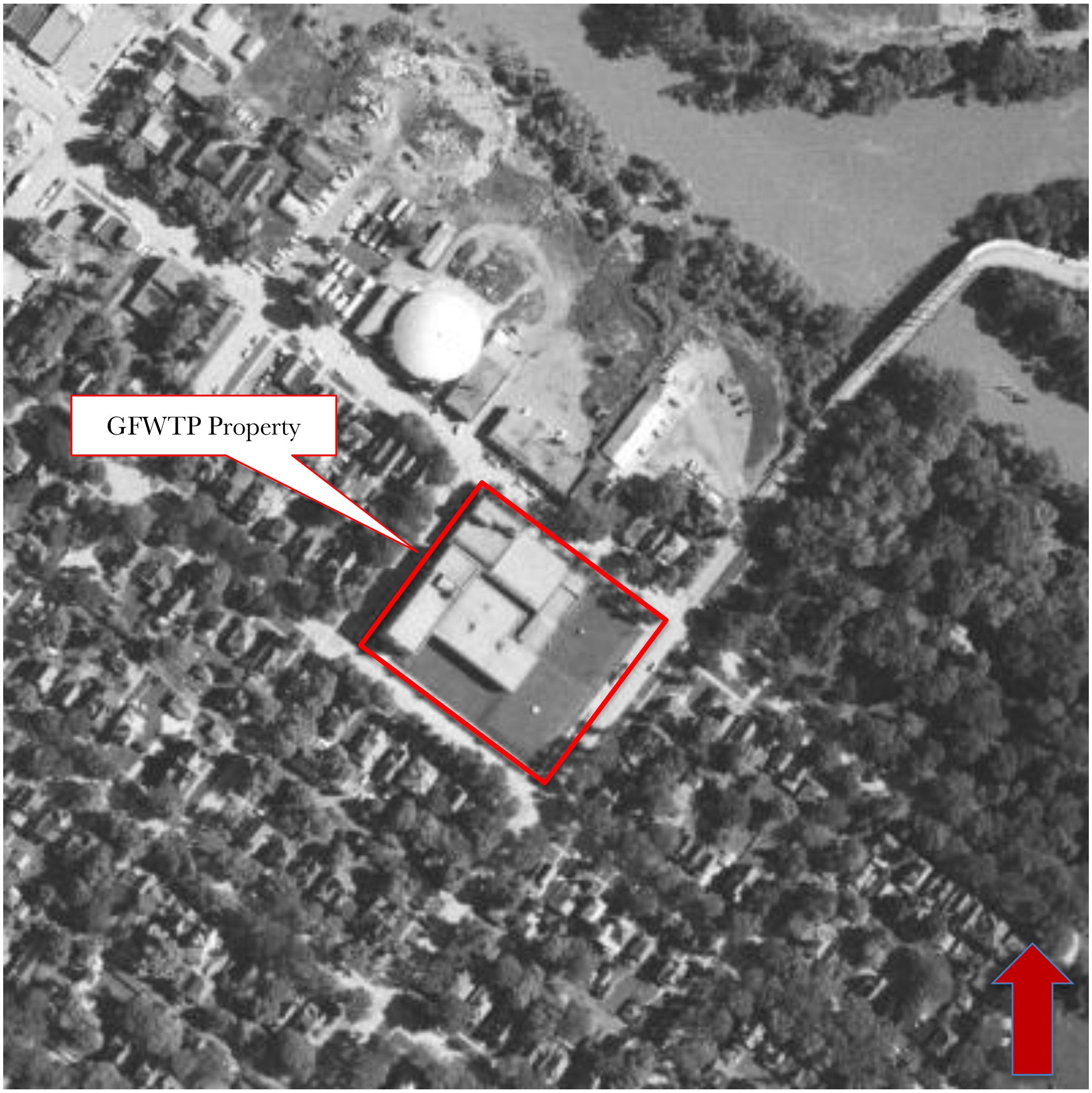


Grand Forks Water Treatment Plant, Plant Complex, USGS:



Portion of Grand Forks Topographical Map Scale 1:24000 Map, 2020:

Portion of 1957-1962, USDA-Aerial Photography Field Office and State Water Commission Aerial Photograph, Scale 1:20,000 (NDGISHUB):



HISTORIC AMERICAN ENGINEERING RECORD

INDEX TO PHOTOGRAPHS

GRAND FORKS WATER TREATMENT PLANT
412 and 502 South 3rd Street, and 503 South 4th Street
Grand Forks
Grand Forks County
North Dakota

INDEX TO BLACK AND WHITE PHOTOGRAPHS

Robert C Park, Photographer, June 6-7, 2022

ND-18-01 Contextual view of GFWTP along S. 3rd St. from the top level of a public parking garage located near the corner of S. 3rd St. and Division Ave; facing southeast. Complex is visible center-right above trees.

ND-18-02 Contextual view of GFWTP along S. 3rd St. near the corner of S. 3rd St. and Gertrude Ave; facing southeast.

ND-18-03 Contextual view of GFWTP along S. 4th St. near the corner of S. 4th St. and Gertrude Ave; facing southeast. GFWTP is visible on right.

ND-18-04 Contextual view of GFWTP along S. 4th St. (left of frame) and walking/bike path atop earthen levy between Kannowski and Central Parks; facing northwest. GFWTP is visible center-left behind the Raw Water Intake Facility at Kannowski Park.

ND-18-05 Contextual view of GFWTP along S. 3rd St. (right of frame) and walking/bike path atop earthen levy between Kannowski and Central Parks, located by Rydell Skatepark (left) and the Raw Water Intake Facility in Kannowski Park (center); facing northwest. GFWTP is visible center-right of frame.

ND-18-06 Contextual panoramic sequence (1 of 6) from atop Raw Water Intake Facility in Kannowski Park; facing southwest. View depicts intersection of S. 4th St. and Minnesota Ave.

ND-18-07 Contextual panoramic sequence (2 of 6) from atop Raw Water Intake Facility in Kannowski Park; facing west. View depicts south corner of GFWTP featuring an underground 1956 clearwell.

ND-18-08 Contextual panoramic sequence (3 of 6) from atop Raw Water Intake Facility located in Kannowski Park; facing northwest. View depicts east corner of the GFWTP and the city levy wall along S. 3rd St.

ND-18-09 Contextual panoramic sequence (4 of 6) from atop Raw Water Intake Facility located in Kannowski Park; facing north. View depicts intersection of S. 3rd St. and Minnesota Ave with the Red River in the background.

ND-18-10 Contextual panoramic sequence (5 of 6) from atop Raw Water Intake Facility located in Kannowski Park; facing northeast. View depicts Minnesota Ave. crossing the Red River from North Dakota into Minnesota.

ND-18-11 Contextual panoramic sequence (6 of 6) from atop Raw Water Intake Facility located in Kannowski Park; facing east. View depicts the flood plain of Red River and storm water pond of Central Park beyond the earthen levy that surrounds Kannowski Park.

ND-18-12 Oblique view of south corner of GFWTP at the intersection of S. 4th St. and Minnesota Ave; facing north. Note the grass covers the underground 1956 clearwell.

ND-18-13 Elevation view of GFWTP at the intersection of S. 4th St. and Franklin Ave.; facing northeast.

ND-18-14 Elevation detail view of GFWTP walkway connecting Pretreatment Facility and Plant Complex crossing Franklin Ave.; facing northeast.

ND-18-15 Oblique view of the east corner of GFWTP near the intersection of S. 3rd St. and Minnesota Ave; facing west.

ND-18-16 Elevation view of GFWTP at the intersection of S. 3rd St. and Franklin Ave.; facing southwest.

ND-18-17 Oblique view of GFWTP at the intersection of the alleyway and S. 3rd St. between Franklin Ave and Gertrude Ave; facing southeast.

GRAND FORKS WATER TREATMENT PLANT, PLANT COMPLEX
502 South 3rd Street and 503 South 4th Street
Grand Forks
Grand Forks County
North Dakota

INDEX TO BLACK AND WHITE PHOTOGRAPHS

Robert C Park, Photographer, June 6-7, 2022

ND-18-A-01	Oblique view of south corner of Plant Complex from atop the grass-covered underground 1956 clearwell; facing north.
ND-18-A-02	Elevation view of south corner of Plant Complex including grass-covered underground 1956 clearwell; facing northwest from Minnesota Ave.
ND-18-A-03	Elevation detail of window and wall at the south corner of Plant Complex; facing northwest.
ND-18-A-04	Oblique view of southwest façade of Plant Complex along S. 4th St. near the intersection of S. 4th St. and Minnesota Ave; facing north.
ND-18-A-05	Elevation view of southwest façade of Plant Complex along S. 4th St.; facing northeast.
ND-18-A-06	Oblique detail view of entryways on the southwest façade of Plant Complex facade along S. 4th St.; facing east.
ND-18-A-07	Oblique detail view of a vent and ports protruding from the southwest façade of Plant Complex, and the sidewalk along of the S. 4th St.; facing northwest.
ND-18-A-08	Elevation view of main entry of the southwest façade of Plant Complex along S. 4th St. near the intersection of S. 4th St. and Franklin Ave.; facing northeast.

ND-18-A-09	Elevation detail view of main entry of the southwest façade of Plant Complex along S. 4th St. near the intersection of S. 4th St. and Franklin Ave.; facing northeast.
ND-18-A-10	Oblique detail view of main entry of the southwest façade of Plant Complex, depicting stairs and railing along S. 4th St. near the intersection of S. 4th St. and Franklin Ave.; facing east.
ND-18-A-11	Oblique detail view of window on southwest façade of Plant Complex along S. 4th St. near the intersection of S. 4th St. and Franklin Ave.; facing and east.
ND-18-A-12	Oblique view of Plant Complex at the intersection of S. 4th St. and Franklin Ave.; facing east.
ND-18-A-13	Oblique detail view of the northwest façade of Plant Complex along Franklin Ave.; facing east.
ND-18-A-14	Elevation view of the right half of the northwest façade of Plant Complex along Franklin Ave.; facing southeast.
ND-18-A-15	Oblique view of the northwest façade of Plant Complex along Franklin Ave. taken from the roof of the south corner of NW Section; facing east.
ND-18-A-16	Oblique view of the skyway and northwest façade of Plant Complex along Franklin Ave. taken from the roof of the east corner of NW Section; facing east.
ND-18-A-17	Oblique view of the northeast façade of Plant Complex along S. 3rd St. at the intersection of S. 3rd St. and Minnesota Ave; facing west.
ND-18-A-18	Oblique view of the northeast facade of GFWTP along S. 3rd St. and the city floodwall (right), between Minnesota Ave. and Franklin Ave; facing west.

ND-18-A-19	Plant Complex interior; 1956/1984 plant laboratory; facing west.
ND-18-A-20	Plant Complex interior; 1956/1984 plant laboratory; facing west.
ND-18-A-21	Plant Complex interior; 1956/1984 plant lime transfer room; facing north.
ND-18-A-22	Plant Complex interior; 1956/1984 plant softening basin room; facing east.
ND-18-A-23	Plant Complex interior; 1956/1984 plant softening basin; facing northeast.
ND-18-A-24	Plant Complex interior; 1956/1984 plant chemical valve controls; facing west.
ND-18-A-25	Plant Complex interior; 1956/1984 plant filter gallery room; facing northeast.
ND-18-A-26	Plant Complex interior; 1956/1984 plant intermediate basin; facing west.
ND-18-A-27	Plant Complex interior; 1968 plant walkway between filter basin and detention basin; facing northwest.
ND-18-A-28	Plant Complex interior; 1956/1984 plant chemical pumps; facing south.
ND-18-A-29	Plant Complex interior; 1956/1984 plant soda ash and lime dust filter hoppers; facing west.

GRAND FORKS WATER TREATMENT PLANT, PRETREATMENT FACILITY
412 South 3rd Street
Grand Forks
Grand Forks County
North Dakota

INDEX TO BLACK AND WHITE PHOTOGRAPHS

Robert C Park, Photographer, June 6-7, 2022

ND-18-B-01	Oblique view of Pretreatment Facility at the intersection of S. 4th St. and Franklin Ave; facing north.
ND-18-B-02	Elevation view of the southwest façade of Pretreatment Facility along S. 4th St.; facing northeast.
ND-18- B-03	Oblique view of GFWTP along S. 4th St.; facing east.
ND-18- B-04	Elevation view of the left half of the northwest façade of Plant Complex along Franklin Ave.; facing southeast.
ND-18- B-05	Oblique view of the southeast façade of Pretreatment Facility including the skyway and the intersection of S. 3rd St. and Franklin Ave; facing north.
ND-18- B-06	Elevation view of right side of the southeast facade of Pretreatment Facility along Franklin Ave; facing northwest.
ND-18- B-07	Elevation view of the northeast facade of Pretreatment Facility along Franklin Ave near the intersection of S. 3rd St. and Franklin Ave (to left out of frame); facing southwest.
ND-18- B-08	Oblique view of the east corner of Pretreatment Facility from the intersection of S. 3rd St. and Franklin Ave; facing west.

ND-18- B-09	Oblique view Pretreatment Facility at the intersection of the alleyway and S. 3rd St. between Franklin Ave and Gertrude Ave; facing south.
ND-18- B-10	Oblique view (closer) of Pretreatment Facility at the intersection of the alleyway and S. 3rd St. between Franklin Ave and Gertrude Ave; facing south.
ND-18- B-11	Pretreatment Facility interior; clarifier (pulsator); facing southwest.
ND-18- B-12	Pretreatment Facility interior; clarifier (pulsator); facing northwest.
ND-18- B-13	Pretreatment Facility interior; carbon feeding room; facing northeast.

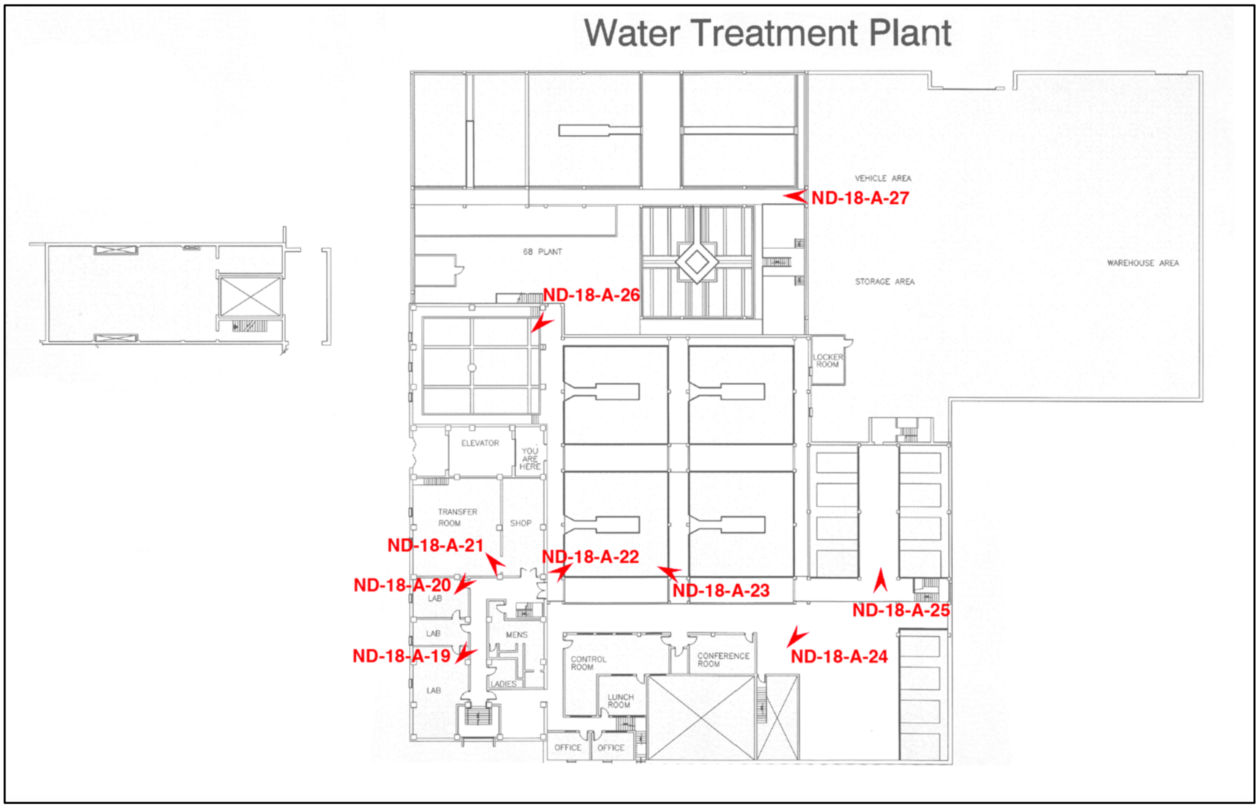
GRAND FORKS WATER TREATMENT PLANT, RESIDUAL PUMP STATION
412 South 3rd Street
Grand Forks
Grand Forks County
North Dakota

INDEX TO BLACK AND WHITE PHOTOGRAPHS

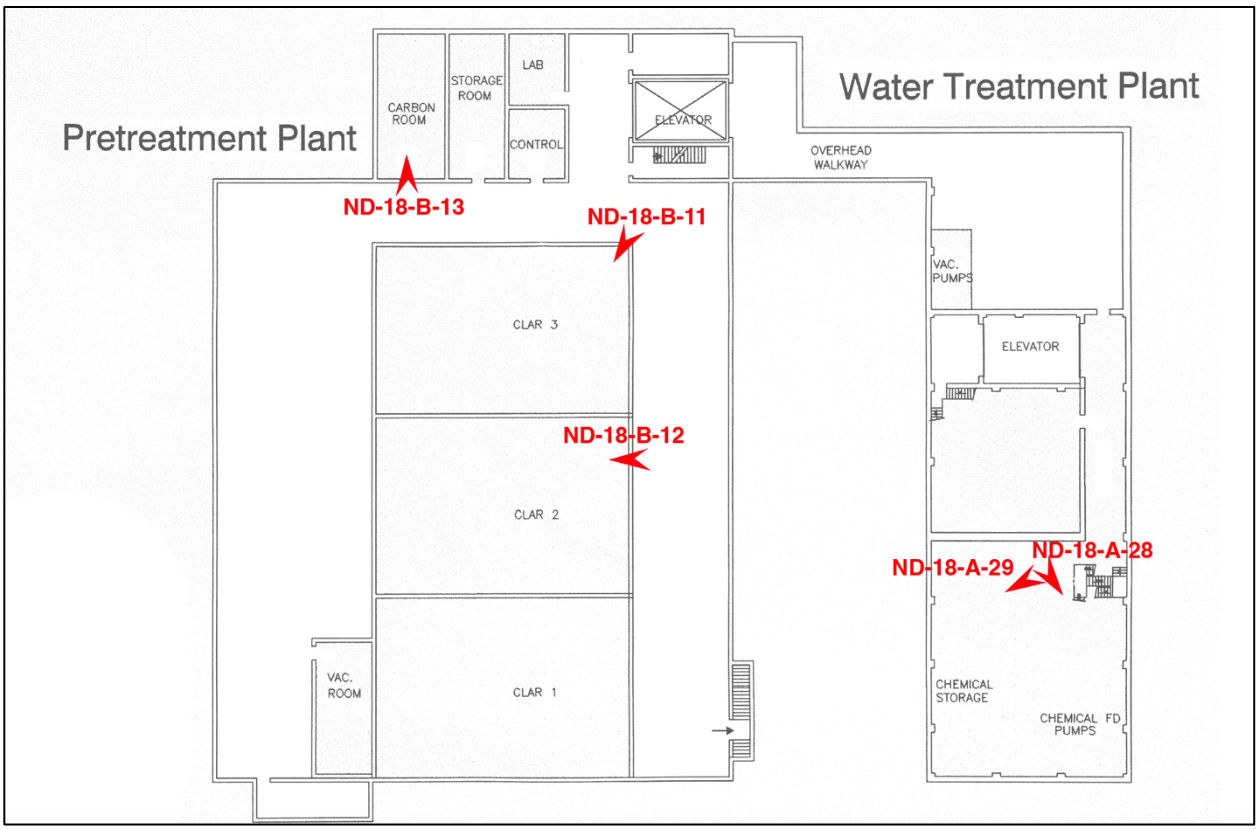
Robert C Park, Photographer, June 6-7, 2022

ND-18-C-01	Oblique detail view of the Residual Pump Station adjacent to the Pretreatment Facility from the intersection of S. 3rd St. and Franklin Ave; facing west.

Contextual Maps Showing Interior Photo Locations



Credit: Robert C Park, Photographer



Credit: Robert C Park, Photographer

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-1

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-2

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-3

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-4

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-5

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-6

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-7

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-8

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-9

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-10

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-11

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-12

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-13

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-14

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-15

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-16

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-17

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-1

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-2

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-3

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-4

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-5

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-6

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-7

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-8

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-9

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-10

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-11

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-12

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-13

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-14

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-15

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-16

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-17

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-18

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-19

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-20

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-21

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-22

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-23

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-24

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-25

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-26

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-27

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-28

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-A-29

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-B-1

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-B-2

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-B-3

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-B-4

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-B-5

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-B-6

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-B-7

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-B-8

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-B-9

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-B-10

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-B-11

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-B-12

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-B-13

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION
HAER No. ND-18-C-1

HISTORIC AMERICAN ENGINEERING RECORD

INDEX TO FIELD RECORDS

Historic Views, Images, and Newspaper Articles

1. *The Grand Forks Daily Herald*, Friday, November 17, 1916. Source: Genealogy Bank.

2. *The Grand Forks Herald*, Monday, Wednesday, February 7, 1917. Source: Genealogy Bank.

3. *The Grand Forks Herald*, Sunday, Wednesday, May 3, 1922. Source: Genealogy Bank.

4. *Sanborn Fire Insurance Company Map*, 1888. Source: Library of Congress

5. *Sanborn Fire Insurance Company Map*, 1892. Source: Library of Congress

6. *Sanborn Fire Insurance Company Map*, 1897. Source: Library of Congress

7. *Sanborn Fire Insurance Company Map*, 1901. Source: Library of Congress

8. *Sanborn Fire Insurance Company Map*, 1906. Source: Library of Congress

9. *Sanborn Fire Insurance Company Map*, 1912. Source: Library of Congress

10. *Sanborn Fire Insurance Company Map*, 1916. Source: Library of Congress

11. *Grant Forks Water Treatment Plant*, 1997. Source: FEMA

PLAN ACCEPTED FOR SOFTENING OF CITY WATER

City Council Adopts Ideas of the Great Northern Expert.

COST OF WORK TO BE ABOUT $9,000

Plans and Specifications to Be Prepared by the City Engineer.

Convened in the fourth adjourned session of the last regular meeting, the city council last evening listened to C. K. Koyl, engineer of the water softening devices of the Great Northern railroad, while he explained what he thought would be a workable plan for the city of Grand Forks. After hearing his arguments the council adopted his plan. Mr. Koyl said: "I have nothing to sell; I come as adviser only."

The chief features of his report follow:

"The present city water plant lends itself readily to the addition of water softening appliances. It has on the north two long and narrow settling basins, in the center a large square settling basin, and on the south the sand filter and clear water basin. The addition of a mixing basin, with storage room for lime and soda, and appliances for regulating the supply of these reagents to suit the character and amount of raw water, complete the necessities for a softening plant.

Mixing Basin.

"Since softening water settles at 10 times the rate of raw water, and there is therefore more settling space than necessary, the natural and simple plan is to convert the first long and narrow settling basin into a mixing basin, and to place above it a building which shall be both operating room and storage room.

The first essential of water softening, or water treatment of any kind, is exact adjustment of the amounts of

(Continued on Page 5.)

1). *The Grand Forks Daily Herald,* Friday, November 17, 1916. Source: Genealogy Bank.

WATER PROBLEM MAY BE CARED FOR VERY SOON

City Solons Decide to Advertise for Bids for Softening Plant.

Members of the city council, at a special meeting held in the city hall last evening, took preliminary steps toward the clearing up of the celebrated water problem that has confronted them for considerable time. At the meeting last night a suppdementary report, prepared by Dean E. J. Babcock of the engineering department of the university, after a thorough research and investigation which has occupied his time and attention for the past two months, was presented. The report was lengthy, giving details of the findings of Dean Babcock in his work, and proposing a method of overcoming the present difficulties being experienced.

Dean Babcock's Report.

In that the report was exceedingly lengthy, the following paragraphs will explain explicitly the situation, eliminating minor details that cannot be presented at this time:

"A water softening system is undoubtedly desirable, but since the modification of our present method of treatment, is, in my judgment, fully as important as the addition of a softening unit, and, furthermore, since these two should be considered together in adopting any system or plans for the reconstruction of our present treatment plants, it would not seem advisable to adopt any of the plans which have thus far been presented, for they do not embrace the changes in our present treatment, which I consider very essential in addition to the softening unit.

"I would, therefore, recommend that plans, specifications and bids be called for providing for not only a water treatment unit, but also for the revision of our present system of treatment so as to form a complete new unit of treatment, including the softening phase. These bids should be accompanied by a suitable guarantee stating the approximate amount of chemicals to be used and with a maximum limit and guaranteeing standards of efficiency with reference to bacterial content, free alkalinity, degree of hardness, soluble alum and other objectionable constituents."

Will Advertise for Bids.

The city council immediately got into action, approving and accepting Dean Babcock's report, and deciding that bids for a water softening plant, with the above requisites, be advertised for immediately.

Given Vote of Thanks.

The council also unanimously exhibited their appreciation of Dean Babcock's services by offering him a vote of thanks for his painstaking and unceasing efforts toward the coveted goal.

Dr. J. W. Cox of the university health laboratory, was also offered a vote of thanks for his servicse.

Ordinances Presented.

The ordinance committee presented an amendment to section 3, No. 259, for first reading. In the past this ordinance has been somewhat confusing, skating rinks paying a license of $25, while roller rinks and dance halls pay a license of but $10. In that all run the same length of time, it was deemed advisable to amend this ordinance so that in the future skating rinks in building pay a license fee of $10. The amendment was read, and will be given a second reading at the next regular meeting.

An ordinance authorizing the park commission to care for berms and trees throughout the city streets and parks was presented for first reading.

An amendment to section 44, No. 333, requiring an indemnity bond of $5,000 for all areaways and stairways opening into public streets was given first reading.

With all business being cleared up, and owing to the fact that the electric lights failed at a critical moment, the council adjourned until their next regular meeting, Monday evening, March 5.

2). *The Grand Forks Herald*, Monday, Wednesday, February 7, 1917. Source: Genealogy Bank.

GRAND FORKS WATER WORKS ARE PRAISED

Local Men Find Institution Compares Favorably To Plant At Fargo

(The Grand Forks waterworks stands up very favorably in comparison with the system at Fargo according to the following communication addressed to The Herald by John G. Sinclair, acting sanitary engineer, state public health laboratories, University station.)

Grand Forks is interested in maintaining and improving its system of water treatment. When Fargo decided recently to install some additional filter beds and make some other changes it would be to the benefit of the people of Grand Forks to send an inspection party to Fargo while the work was in progress.

Mr. Schlaberg, Mr. Gjerstad and Mr. Sinclair visited Fargo and were very courteously shown about the filter plant. We learned some facts about recent changes in details of filter construction and laboratory equipment but on the whole we came away pretty well satisfied with the Grand Forks filter plant.

Fargo filters about 2,500,000 gallons of water a day compared to our 800,000 to 1,000,000 gallons. We have in operation filter beds with a rated capacity of 2,000,000 gallons. Fargo has had a rated capacity of 4,000,000 gallons and is building filters adding 2,000,000 more. Their reason for spending the $30,000 or more that these cost is the small storage capacity of their clear water basin. Our basin holds a million gallons or a 24 hour supply while the Fargo basin holds less than a million or at best an eight hour supply. They have therefore been required to filter at a rate as high as 6,000,000 gallons during summer days in order to have a fire supply in the clear basin. We on the other hand run our filters slowly and steadily 24 hours of the day and this rate with careful operation should give the best possible bacterial efficiency of the filters.

Fargo is contemplating the addition of a tremendous elevated tank to help as storage and to keep up the pressure in the mains with a varying load. This financial burden is saved to Grand Forks by virtue of its relatively larger clear water basin.

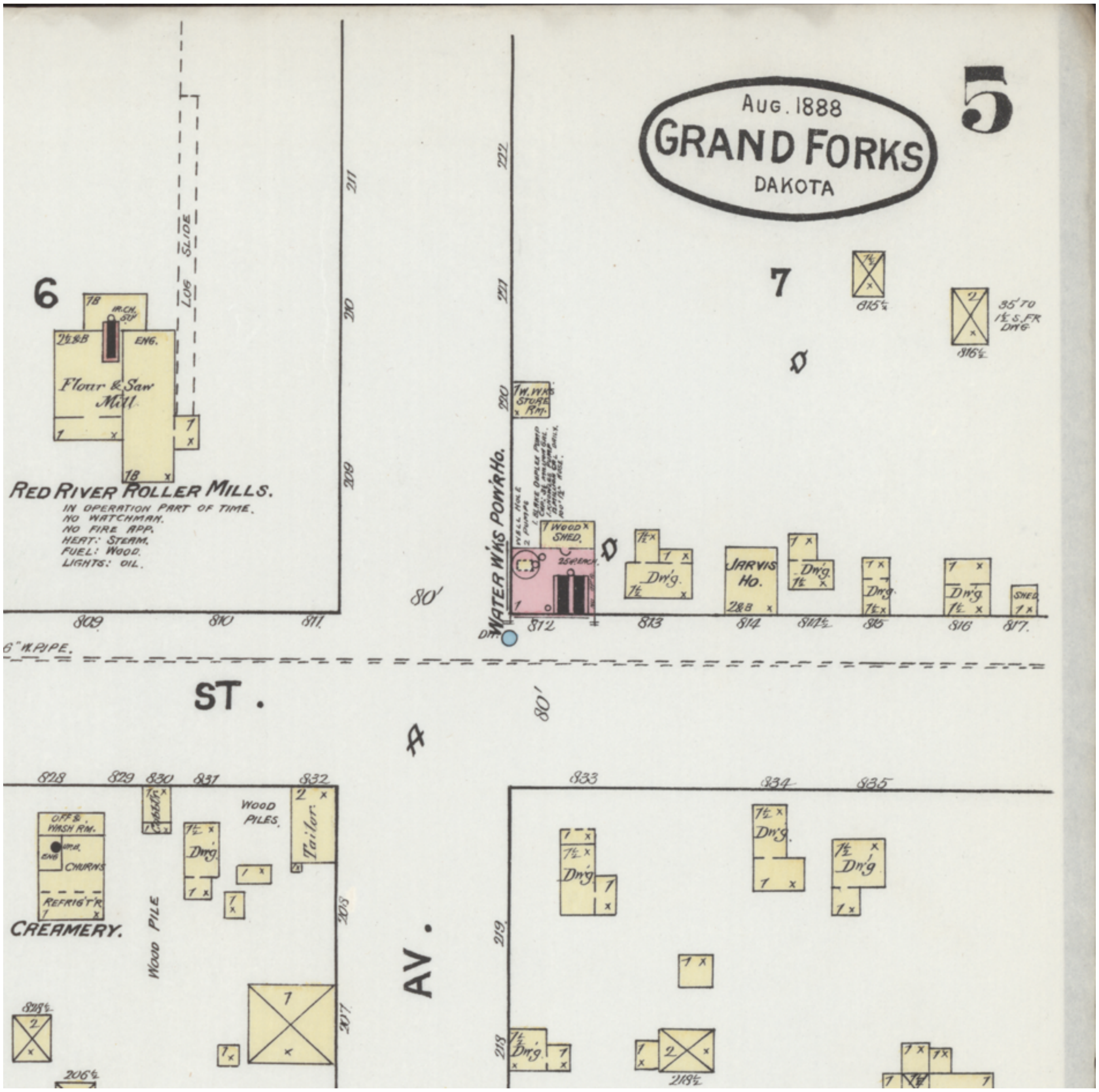
Fargo recently reported a cheaper rate per million gallons for treatment of the Red river water than we find necessary for equivalent treatment of Red Lake River water. Iron sulphate which they use is cheaper than aluminum sulphate but extensive experiments at the public health laboratory show that it cannot be used here. Furthermore the bacterial content of our supply is considerably lower than that of Fargo or the Red river at this point and so is safer.

Several things in particular we noted. We find that after several years of automatic operation of the filter effluent by an expensive and complicated bit of machinery that would not 'automat', they are tearing it all out and are coming back to the manual control from the floor which Grand Forks has always had. Fargo has been chlorinating its water before filtration as East Grand Forks does. They lose a large part of the bactericidal effectiveness of the chlorine as it is used up in oxidizing organic matter that the filter removes anyway. They are changing to the Grand Forks method of chlorinating afterward. In using iron sulphate for precipitation Fargo installed a series of Earl chemical mixers. These complicated and expensive devices corrode and are inaccurate so that Fargo is returning to the simple, inconspicious and effective dry feed machines, enlarged editions of those in use here.

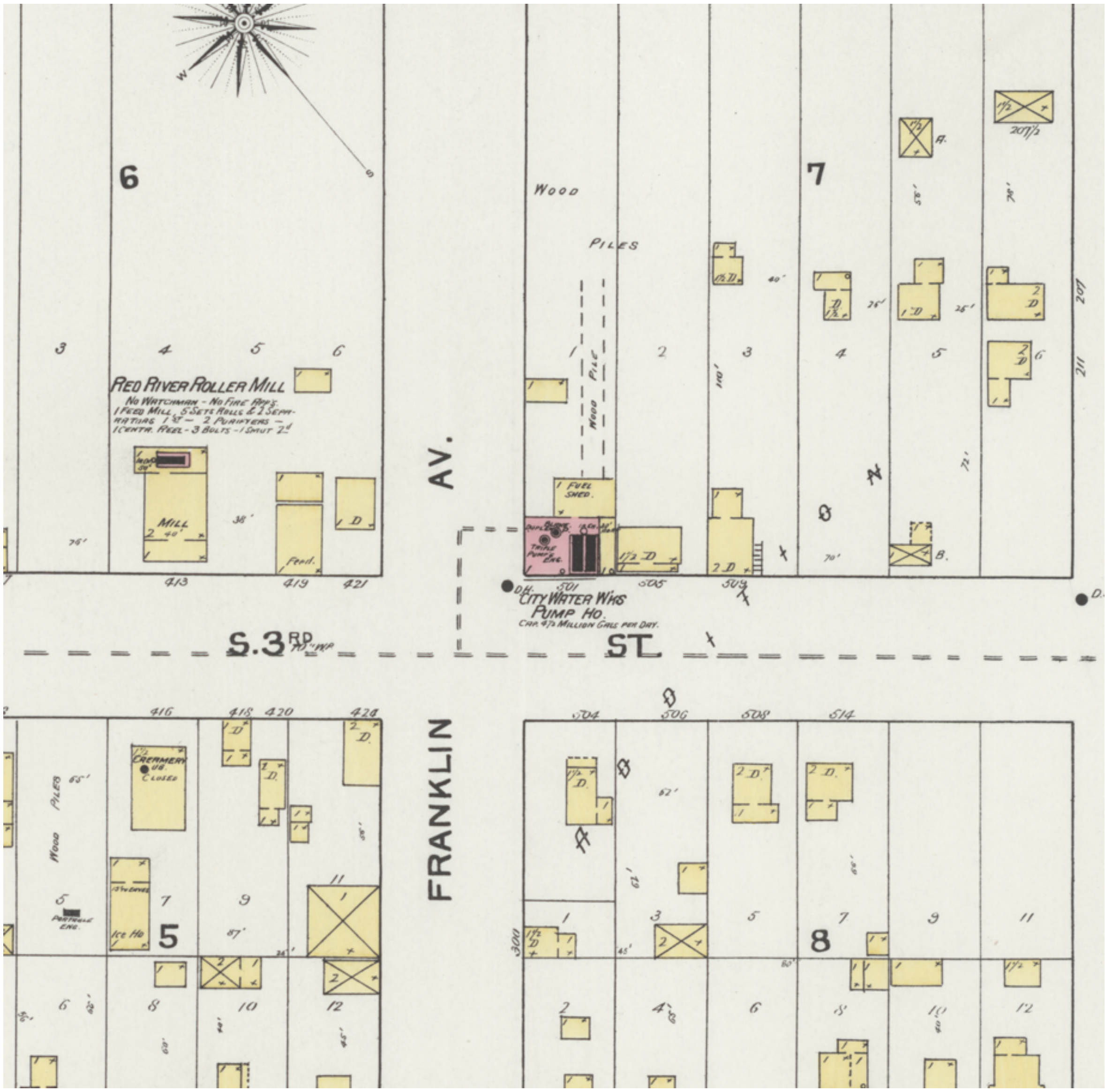
One reason for the differences noted here is the fact that before Grand Forks had a water treatment system and ever since, the engineers at the University have continued to advise the city. For many years this was done gratis. Grand Forks is willing to pay something to maintain health. Fargo has made a dangerous mistake in cutting the appropriation out from under the health officer and the inspection service. Results are indicated by the fact that the Park board allows the building of a bath house for boys within 35 feet of the water intake and up stream. One bacterial count this winter for raw water at Fargo ran 121,000 per c. c. That water might as well have been sewage.

It is the part of wisdom not to pat ourselves on the back but continue the strictest surveillance of our various services.

3). *The Grand Forks Herald*, Sunday, Wednesday, May 3, 1922. Source: Genealogy Bank.

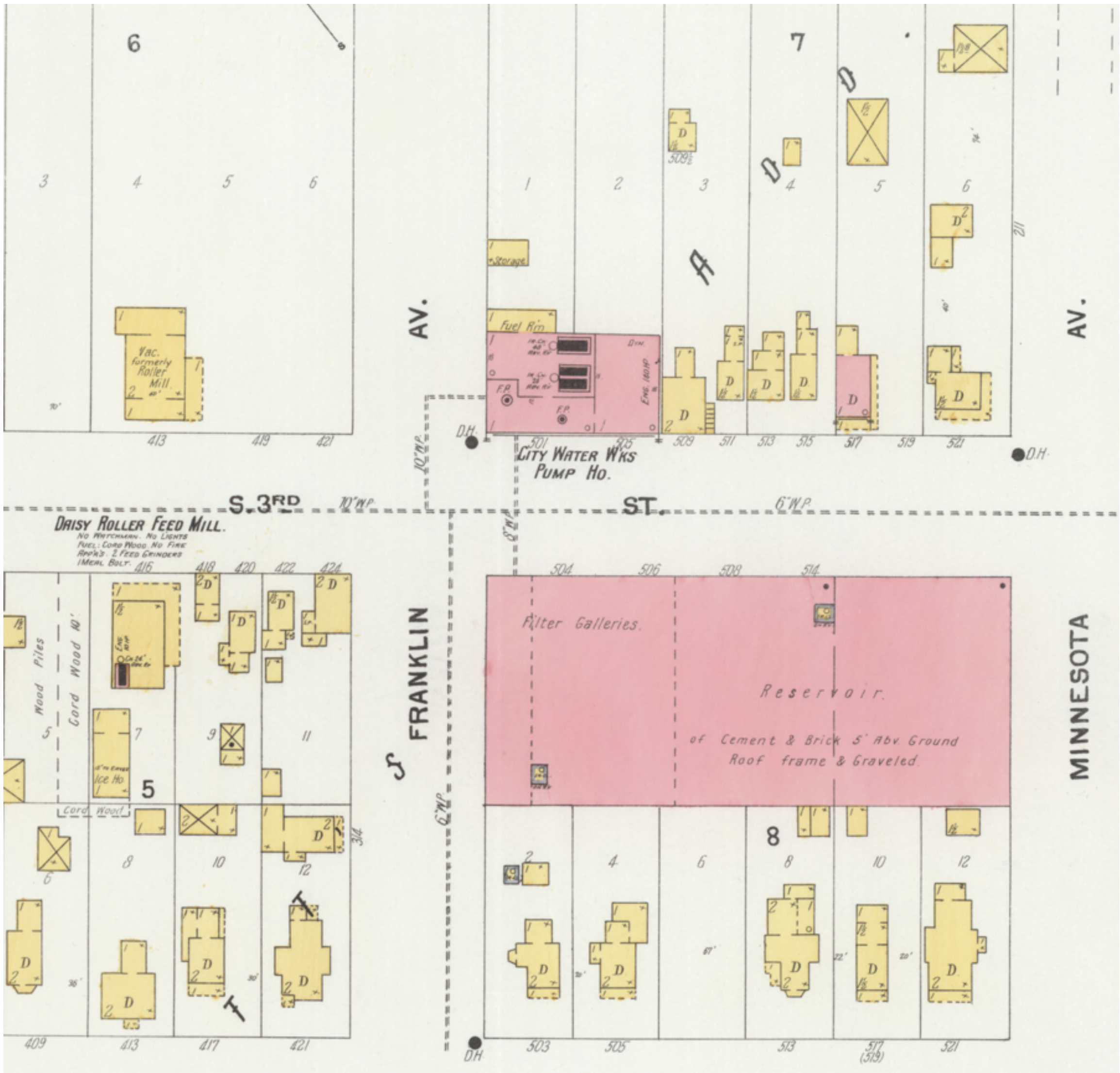


4). *Sanborn Fire Insurance Company Map*, 1888. Source: Library of Congress.



5). *Sanborn Fire Insurance Company Map*, 1892. Source: Library of Congress.

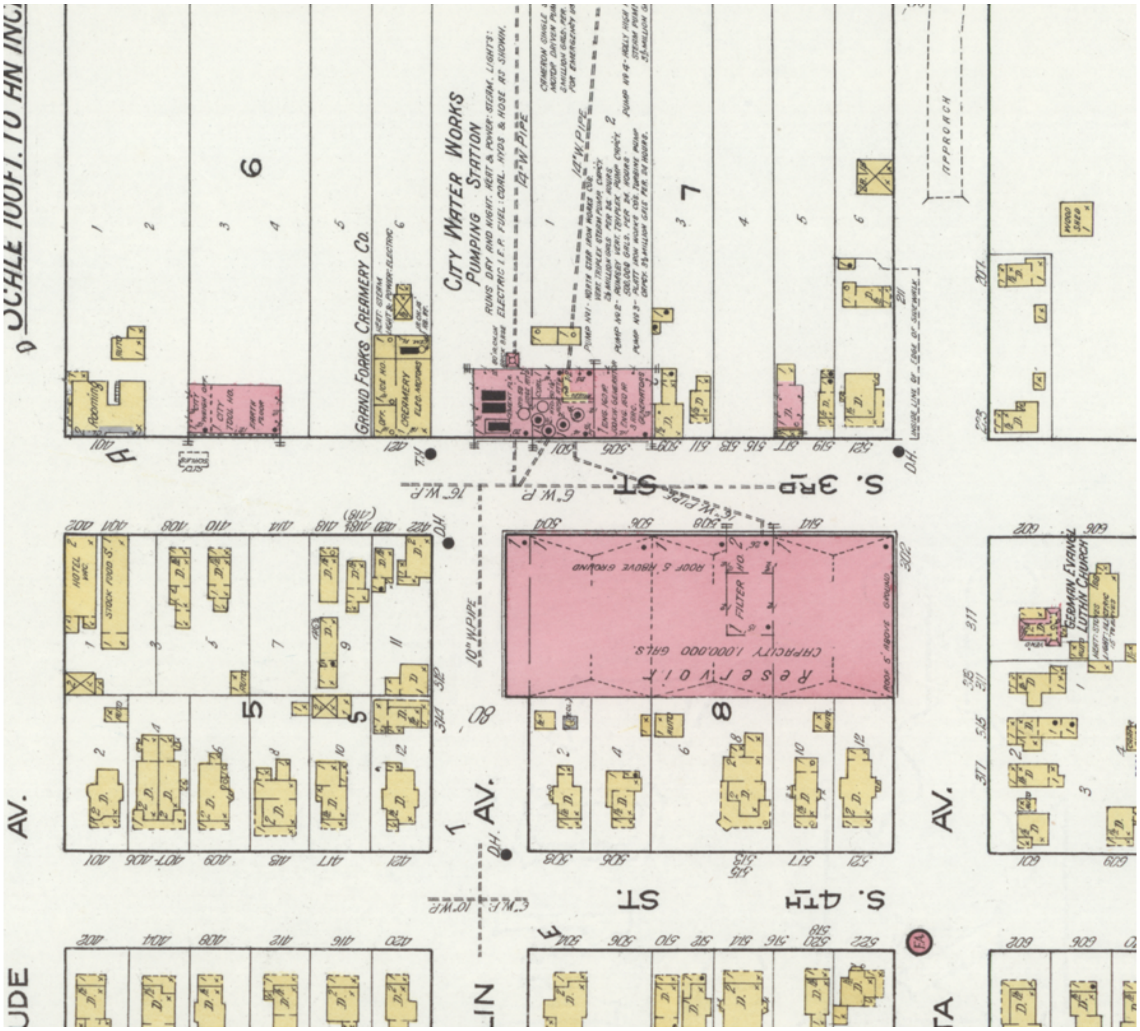
6). *Sanborn Fire Insurance Company Map*, 1897. Source: Library of Congress.



7). *Sanborn Fire Insurance Company Map*, 1901. Source: Library of Congress.

8). *Sanborn Fire Insurance Company Map*, 1906. Source: Library of Congress.

9). *Sanborn Fire Insurance Company Map*, 1912. Source: Library of Congress.



10). *Sanborn Fire Insurance Company Map,* 1916. Source: Library of Congress.

11). *Grand Forks Water Treatment Plant*, 1997. Source: FEMA.